Appendix C

Red River Crossing Analysis Technical Report

MEMORANDUM

To: **Earl Haugen, Executive Director Grand Forks – East Grand Forks MPO**

From: **Brandon Bourdon, P.E. (ND, MN), Kimley-Horn and Associates**

Date: **September 27, 2018**

Re: **Grand Forks-East Grand Forks MPO 2045 Street/Highway Plan Update**
River Crossing Alternatives Analysis

A variety of additional potential Red River crossing locations have been included in prior Grand Forks – East Grand Forks long range transportation plans. These additional river crossings have been discussed, documented, and analyzed at varying degrees since the late 1960s. Since the 2004 long range transportation plan update, the locations for any new river crossings have included both the 32nd Avenue S and Merrifield Road river crossings. The Merrifield Road crossing has been a "bypass" option that would provide regional benefit by reducing trips, particularly truck trips, through the urbanized area.

There has been renewed interest in adding an additional river crossing(s) recently. Since the Grand Forks – East Grand Forks Metropolitan Planning Organization (MPO) is in the process of updating the region's transportation plan, a high-level transportation focused planning analysis has been completed to assess some transportation benefits of several potential river crossings. This analysis focuses on the transportation planning impacts of the following potential river crossing locations:

- 17th Avenue S
- Elks Drive (formerly referenced as 24th Avenue S)
- 32nd Avenue S
- 47th Avenue S
- Merrifield Road

Advanced Traffic Analysis Center (ATAC) has been completing travel demand modeling as part of the 2045 Street/Highway Plan Update. ATAC used the regions travel demand model for this analysis to develop 2045 daily traffic forecasts. Kimley-Horn and WSB used these forecasts to analyze regional traffic pattern changes, link level volume to capacity (V/C) ratios, and local intersection level of service (LOS) for each of the five potential new river crossings scenarios. Each river crossing was analyzed at a regional and local level to allow for a comparison of transportation impacts. The purpose of this memorandum is to summarize the findings of this analysis.

In February 2018, an analysis was completed for the 24th Avenue S, 32nd Avenue S, 47th Avenue S, and Merrifield Road river crossings. That also included the analysis of level of service at six intersections. This document has been revised to include additional analysis as directed by the Executive Board to revise the 24th Avenue S crossing to Elks Drive, add the 17th Avenue S crossing, and analyze intersection level of service at 15 intersections. One reason 24th Avenue S was referred to previously was familiarity with that roadway as opposed to Elks Drive that is less known in the community due to its much shorter length. **Figure 1** shows the location of Elks Drive, 24th Avenue S and their proximity to Grand Forks County Historical Society.

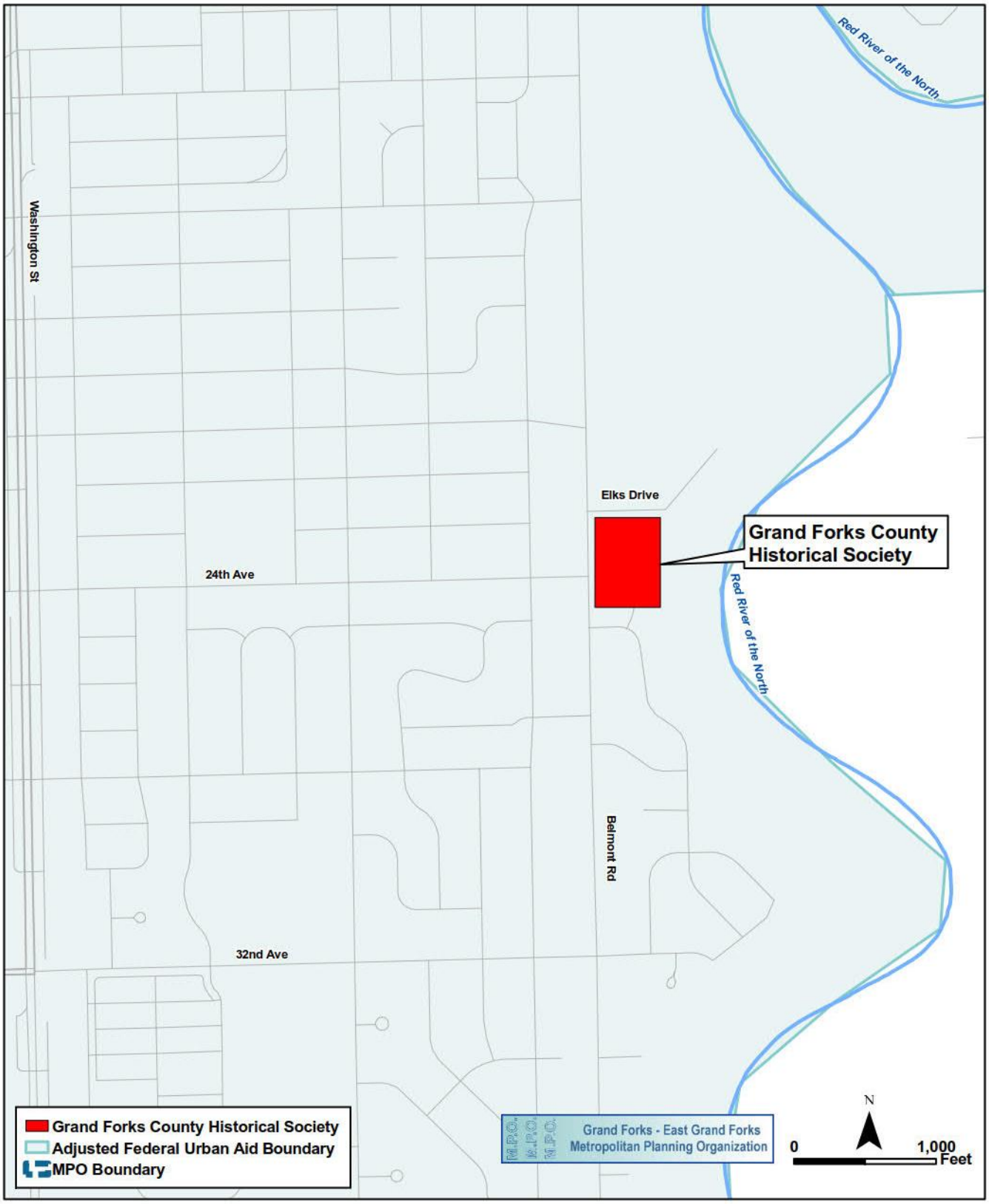


Figure 1: Location of Elks Drive

Existing and No Build Traffic Conditions

Existing and No Build traffic conditions were analyzed on both a link and intersection LOS basis. The No Build scenario assumes no additional river crossing will be constructed. The link level analysis focused on several key corridors within the urbanized area of the MPO. The corridors analyzed are:

- Gateway Drive (US 2) from Columbia Road to Central Avenue
- DeMers Avenue from S Columbia Road to 4th Street NW (Business US 2)
- 4th Avenue S / Minnesota Avenue / 1st Street SE from DeMers Avenue to 3rd Avenue SE
- Bygland Road / 3rd Avenue SE / 2nd Avenue NE from Rhinehart Drive to Business US 2
- 4th Street NW / Business US 2 from DeMers Avenue to Polk CSAH 17
- TH 220 between US 2 and Polk CSAH 72
- 17th Avenue S from S Washington Street to Belmont Road
- 24th Avenue S from S Washington Street to Belmont Road
- 32nd Avenue S from Columbia Road to Belmont Road
- 47th Avenue S from S Washington Street to Belmont Road
- Belmont Road from 4th Avenue S to 17th Avenue S
- S Washington Street from DeMers Avenue to 55th Avenue S

Figure 2 below, shows the location of the analyzed corridors. The proposed new river crossing corridors were also analyzed.

In addition to the corridors, fifteen intersections were analyzed at an overall intersection LOS basis. The analyzed intersections include the following:

- 1st Street SE at 3rd Avenue SE
- Greenway Boulevard SE, Bygland Road SE, 13th Street SE
- Greenway Boulevard SE at Rhinehart Drive SE
- DeMers Avenue at N 5th Street
- DeMers Avenue at S Washington Street
- S Washington Street at 17th Avenue S
- S Washington Street at 24th Avenue S
- S Washington Street at 32nd Avenue S
- S Washington Street at 47th Avenue S
- 4th Avenue S at Belmont Road
- 17th Avenue S at Belmont Road
- Elks Drive at Belmont Road
- 24th Avenue S at Belmont Road
- 32nd Avenue S at Belmont Road
- 47th Avenue S at Belmont Road

Traffic patterns are anticipated to change at the intersection of US 2 / TH 220 / CR 76 if a river crossing was constructed. These changes in traffic patterns would result in lower traffic 2045 forecasts to the north on US 2 and higher traffic 2045 forecasts on TH 220. The amount of those changes will vary under each river crossing alternative. Operations and safety should be monitored at this location under future conditions to see if a change in traffic control is required based on changes in traffic patterns or crashes at this location.

Existing traffic patterns were first analyzed at a link level. To complete the link level analysis, ADT volumes (average daily traffic) and V/C ratios under Existing conditions were provided by ATAC. The V/C ratios were then compared to planning level LOS ratings based on typical facility V/C ratios. LOS ratings were then assigned to the links that were reviewed as part of this analysis.

Overall, the urbanized area is operating acceptably under Existing conditions although several links operate LOS C and D. **Figure 3,** below, shows the link level LOS under Existing conditions. **Table 1** below describes the V/C thresholds for each of the LOS criteria.

Table 1: Link Level of Service Thresholds

Level of Service	Link Level Volume to Capacity LOS Threshold
A	0.0 to 0.6
B	>0.6 to 0.7
C	>0.7 to 0.8
D	>0.8 to 0.85
D-	>0.85 to 0.9
E	>0.9 to 1.0
F	>1.0

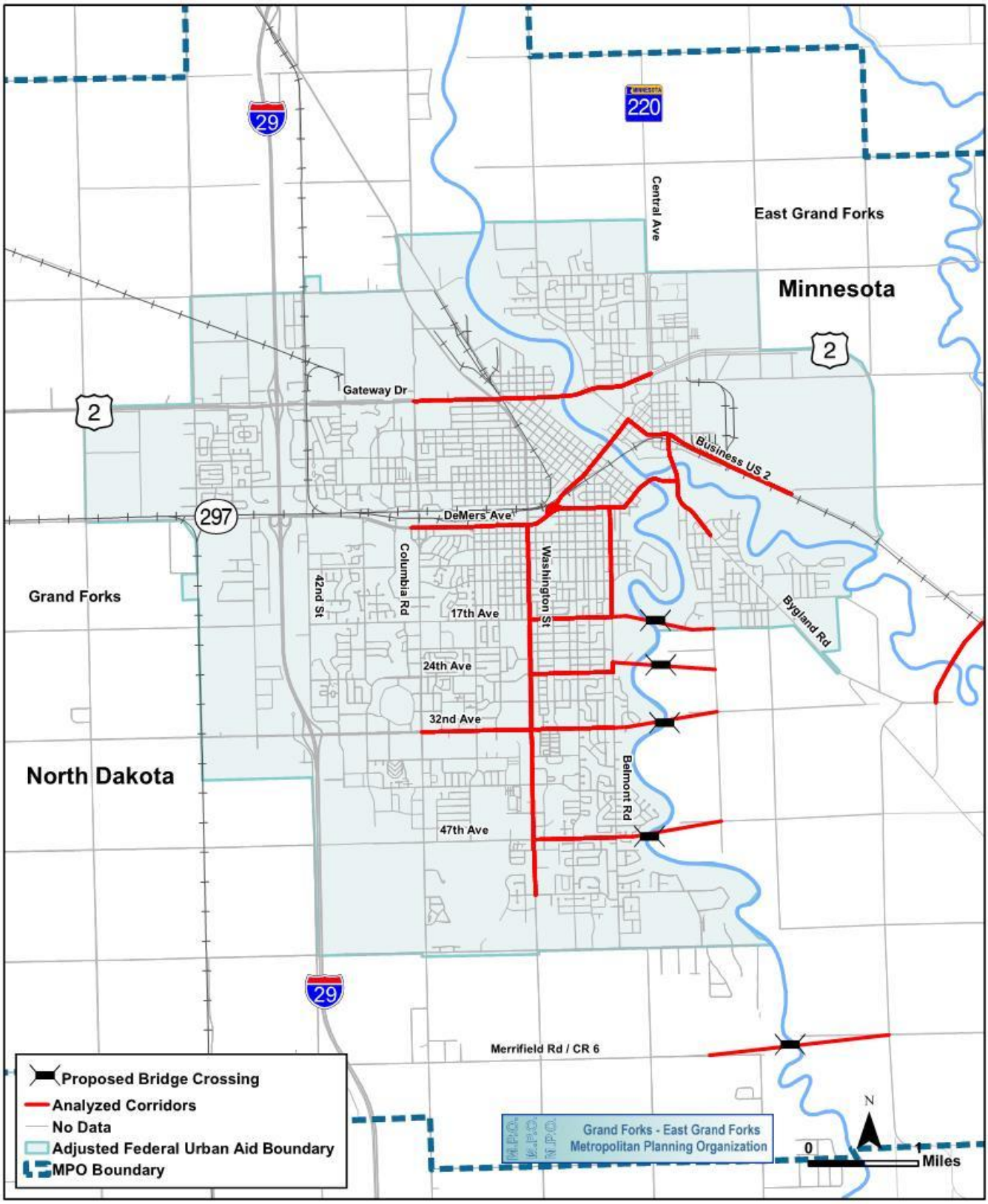


Figure 2: Analyzed Corridors

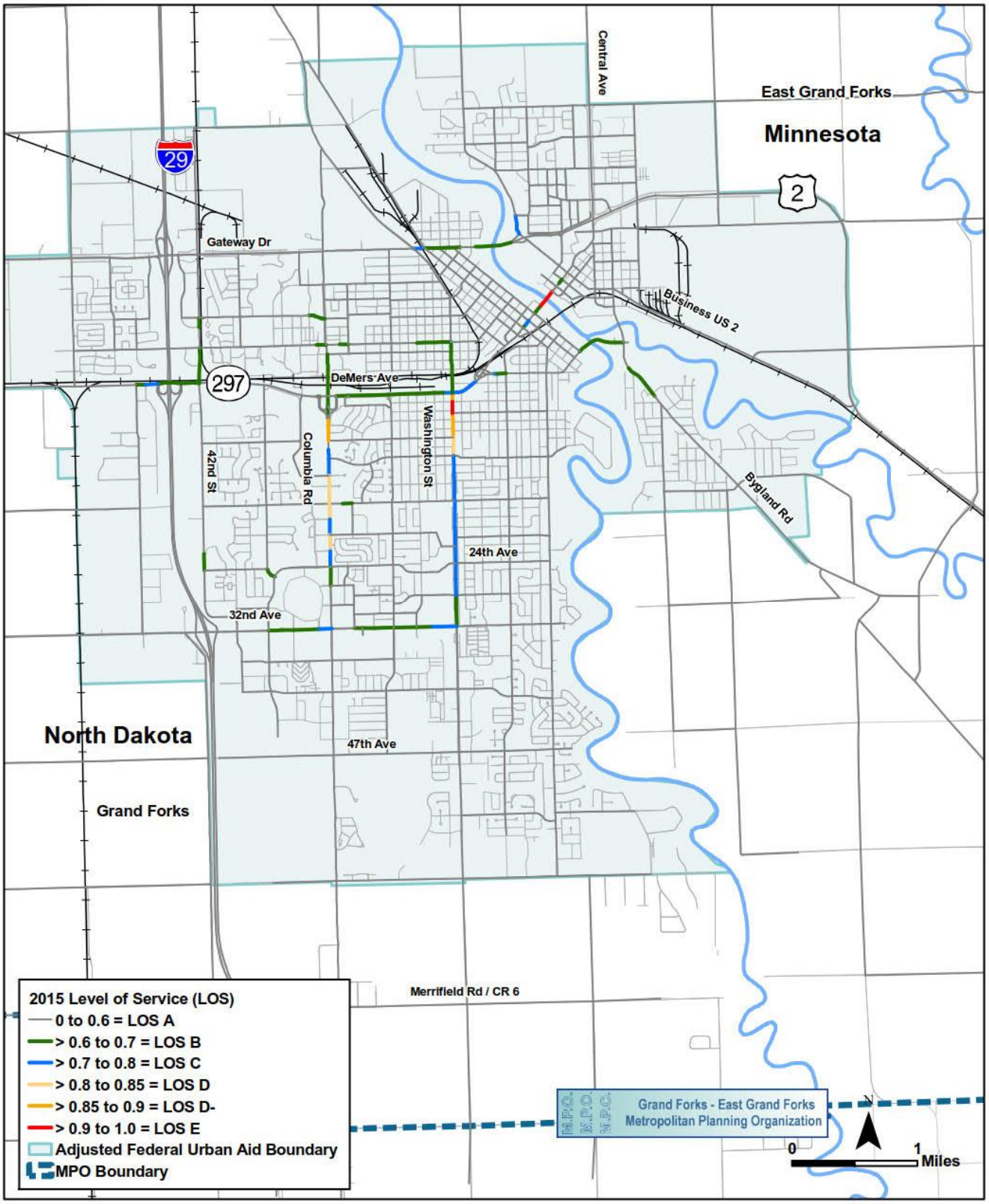


Figure 3: Existing Conditions Link Level LOS Summary

Although analyzing link V/C ratios and LOS are beneficial, another way to analyze traffic is to focus on intersection operations. An intersection capacity analysis can identify operational concerns that may not be apparent by completing a link LOS analysis. To complete the intersection analysis existing turning movement counts, collected in 2017, were used to model intersection operations and review intersection LOS. This analysis was completed during the PM peak hour at the study intersections for Existing, 2045 No Build, and the five potential bridge crossing alternatives under 2045 conditions. Synchro version 9 was used to complete this analysis.

The LOS grades shown below, which are provided in the Transportation Research Board's Highway Capacity Manual (HCM), quantify and categorize the driver's discomfort, frustration, fuel consumption, and travel times experienced as a result of intersection control and the resulting traffic queuing. A detailed description of each LOS rating can be found in **Table 2**.

Table 2: Level of Service Grading Descriptions

Level of Service	Description
A	Minimal control delay; traffic operates at primarily free-flow conditions; unimpeded movement within traffic stream.
B	Minor control delay at signalized intersections; traffic operates at an unimpeded level with slightly restricted movement within traffic stream.
C	Moderate control delay; movement within traffic stream more restricted than at LOS B; the formation of queues contributes to lower average travel speeds.
D	Considerable control delay that may be substantially increased by small increases in flow; average travel speeds continue to decrease.
E	High control delay; average travel speed no more than 33 percent of free flow speed.
F	Extremely high control delay; extensive queuing and high volumes create exceedingly restricted traffic flow.

The range of control delay for each rating (as detailed in the HCM) is shown in **Table 3**. Signalized intersections are expected to carry a larger volume of vehicles and stopping is required during red time, so higher delays are generally tolerated more by drivers for each corresponding LOS ratings. In general, LOS D or better for overall intersection LOS is the accepted standard for existing and future intersection operations.

Table 3: Level of Service Grading Descriptions

Level of Service	Average Control Delay (s/veh) at:	
	Unsignalized Intersections	**Signalized Intersections**
A	0 – 10	0 – 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

For unsignalized intersections, LOS is reported for the worst approach and overall intersection. Similar to the link level analysis, the overall intersection LOS does not show any issues at the analyzed intersections under Existing conditions. **Table 4** below summarizes the Existing PM peak intersection operations.

Table 4: Existing Intersection LOS Summary

Intersection/Crossing Scenario	Existing PM Peak
1st Street SE at 3rd Avenue SE	A
Greenway Boulevard SE, Bygland Road SE, 13th Street SE	A
Greenway Boulevard SE at Rhinehart Drive SE	A
DeMers Avenue at N 5th Street	B
DeMers Avenue at S Washington Street	D
S Washington Street at 17th Avenue S	C
S Washington Street at 24th Avenue S	C
S Washington Street at 32nd Avenue S	D
S Washington Street at 47th Avenue S	B
4th Avenue S at Belmont Road	B
17th Avenue S at Belmont Road	A
Elks Drive at Belmont Road	B
24th Avenue S at Belmont Road	A
32nd Avenue S at Belmont Road	B
47th Avenue S at Belmont Road	A

No Build conditions were analyzed in the same manner as existing conditions except using 2045 No Build ADTs and V/Cs provided by ATAC. Under this scenario, no additional bridge crossings were assumed by 2045. **Figure 4** on the next page shows the link level LOS under 2045 No Build conditions. This analysis shows that several key corridors are operating undesirably (LOS worse than D). All three existing river crossings in addition to segments of S Washington Street and 32nd Avenue S are anticipated to operate at LOS E or F.

The link LOS is anticipated to deteriorate from LOS B to LOS E on the Point Bridge between today and 2045 under No Build conditions. This is not surprising given that ADTs on the Point Bridge have increased by 50% between 2010 and 2015.

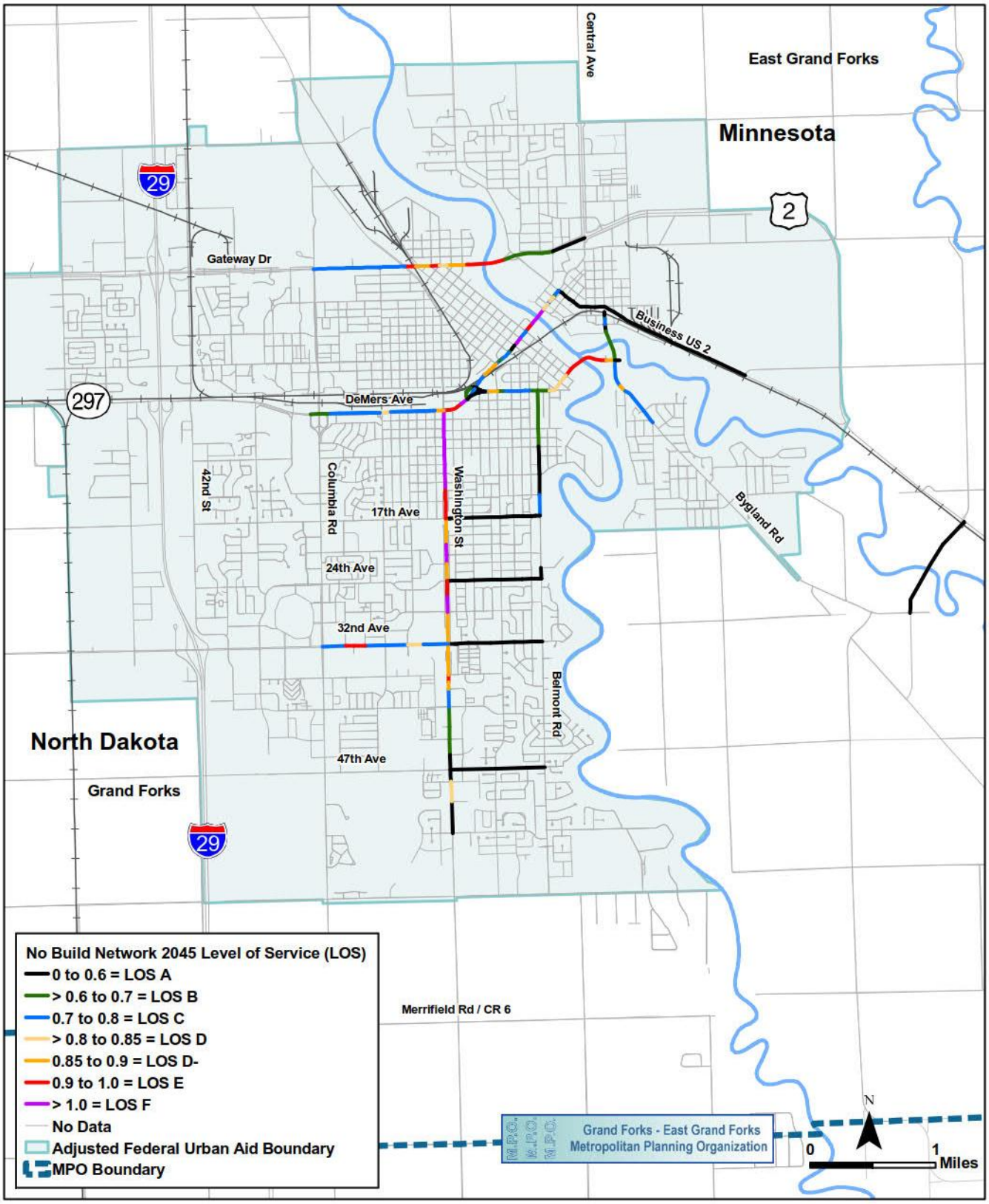


Figure 4: 2045 No Build Conditions Link Level LOS Summary

In addition to the link level analysis, an intersection analysis was also completed. To develop volumes for the 2045 No Build scenario, link ADTs under Existing and 2045 No Build conditions were compared on all intersection approaches. Then a growth factor for each approach was developed based on that comparison. The growth factor was used to adjust the existing turning movement counts to create future turning movement volumes at each intersection.

The intersection LOS analysis shows a similar trend as the link level LOS. The intersections of S Washington Street and DeMers Avenue, S Washington Street and 32nd Avenue S, 4th Avenue S and Belmont Road and 32nd Avenue S and Belmont Road show undesirable operations under 2045 No Build conditions. **Table 5** below is a continuation of **Table 4**, it summarizes the intersection LOS under both Existing and 2045 No Build conditions.

Table 5: Existing and 2045 No Build Intersection LOS Summary

Intersection/Crossing Scenario	Existing PM Peak	2045 No Build PM Peak
1st Street SE at 3rd Avenue SE	A	B
Greenway Boulevard SE, Bygland Road SE, 13th Street SE	A	C
Greenway Boulevard SE at Rhinehart Drive SE	A	A
DeMers Avenue at N 5th Street	B	B
DeMers Avenue at S Washington Street	D	E
S Washington Street at 17th Avenue S	C	D
S Washington Street at 24th Avenue S	C	D
S Washington Street at 32nd Avenue S	D	E
S Washington Street at 47th Avenue S	B	D
4th Avenue S at Belmont Road	B	F
17th Avenue S at Belmont Road	A	A
Elks Drive at Belmont Road	B	C
24th Avenue S at Belmont Road	A	A
32nd Avenue S at Belmont Road	B	F
47th Avenue S at Belmont Road	A	A

The operational challenges at the two S Washington Street intersections are also evident when looking at **Figure 3**, many areas where links are anticipated to operate at LOS E or F occur around these two intersections. The poor operations at 4th Avenue S at Belmont Road are attributed to the existing intersection control. The 2045 No Build volumes exceed the capacity of an all-way stop. The intersection of 4th Avenue S at Belmont Road was recently a signal, but it was removed after a vehicular crash rendered it inoperable. The poor operations at 32nd Avenue S at Belmont Road are attributed to the existing intersection control. The intersection is currently an all-way stop and the anticipated growth on each approach exceeds the capacity of an all-way stop. **Figure 5** on the next page shows intersection LOS values from **Table 5** on a map.

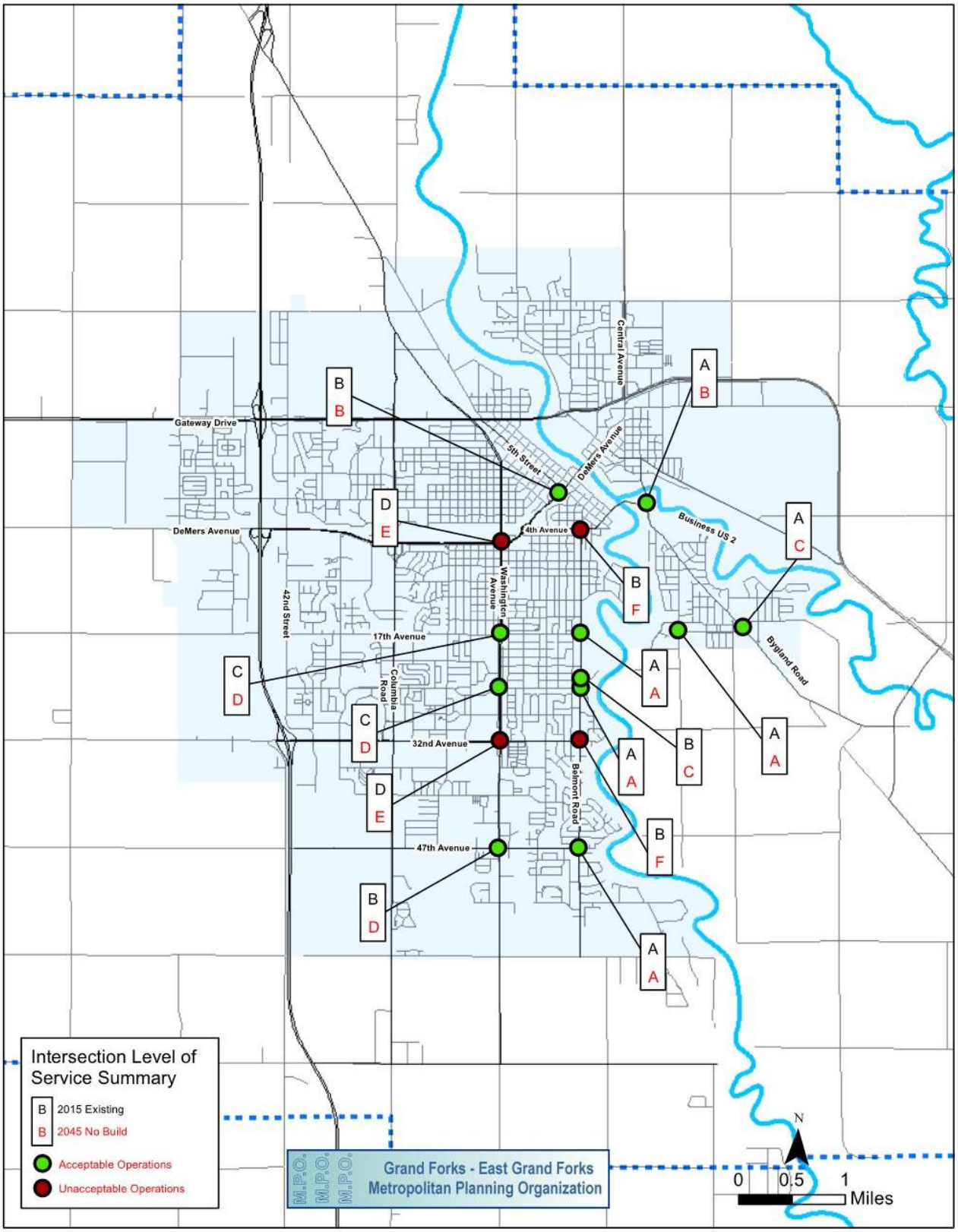


Figure 5: Existing and 2045 No Build Intersection LOS Summary

River Crossing Analysis

Based on input from area political leaders and agency staff in the region, the following five potential new river crossing locations were analyzed: 17th Avenue S, Elks Drive, 32nd Avenue S, 47th Avenue S and Merrifield Road. Each river crossing was analyzed at a local level (intersection and link LOS) and regional level (global metrics such as urban vehicle miles traveled) under 2045 conditions to determine transportation related impacts of each potential crossing on the transportation network. A summary matrix of each river crossing is included at the end of this memo that provides an overall comparison.

Local Impacts

Figures 6 through **15** on the following pages show the corridor ADTs and link level LOS for each of the potential river crossing alternatives. Here are a few observations noted:

- The Point Bridge link LOS operates better under the 17th Avenue S, Elks Drive and 32nd Avenue S river crossing alternatives.
- Gateway Drive operates better under the 17th Avenue S, Elks Drive, 32nd Avenue S, and 47th Avenue S river crossings.
- DeMers Avenue experienced similar operations under each of the alternatives analyzed.
- Belmont Road operations were better under all the river crossing alternatives when compared to the No Build scenario.

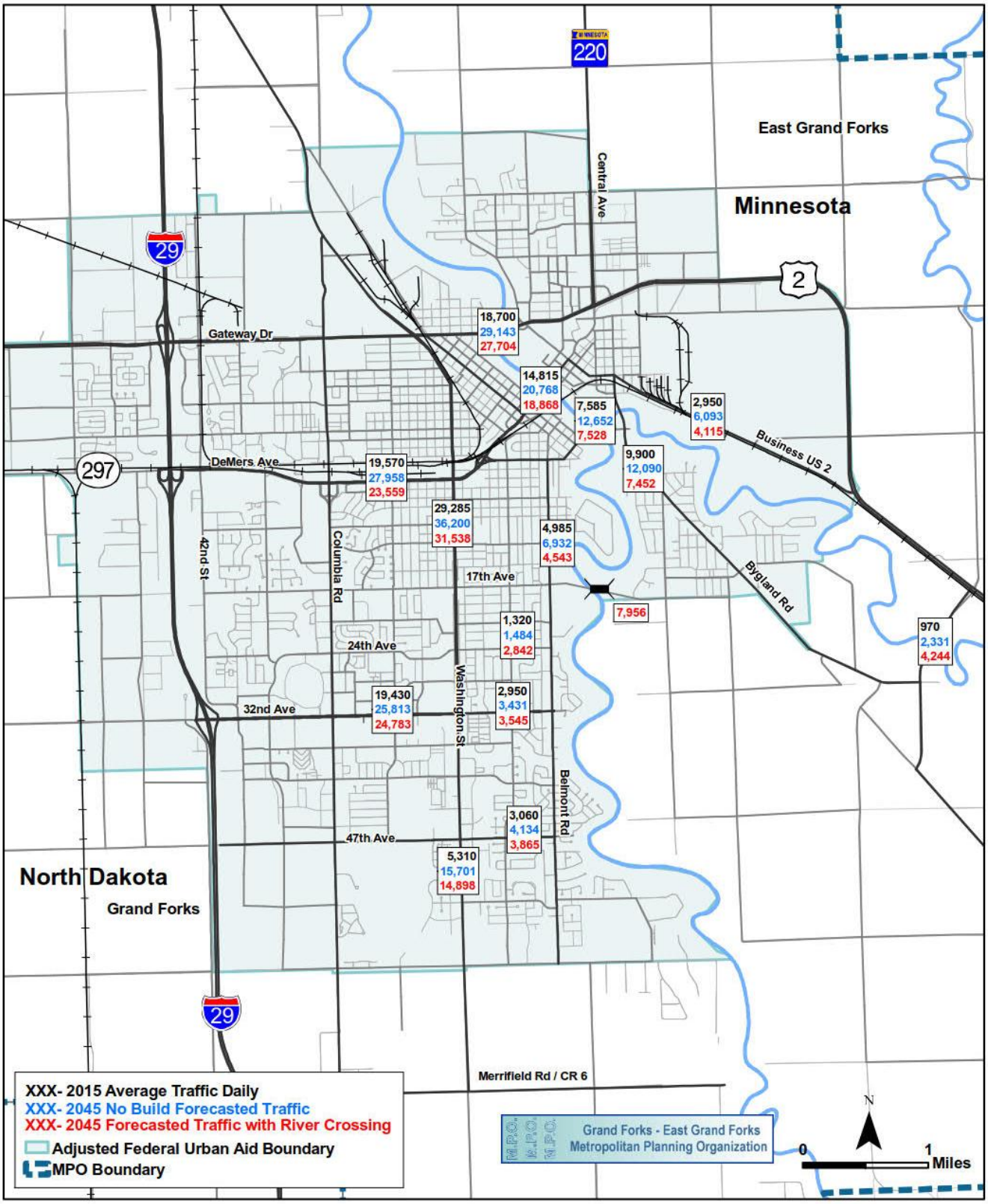


Figure 6: ADT Summary for the Proposed 17th Avenue S River Crossing

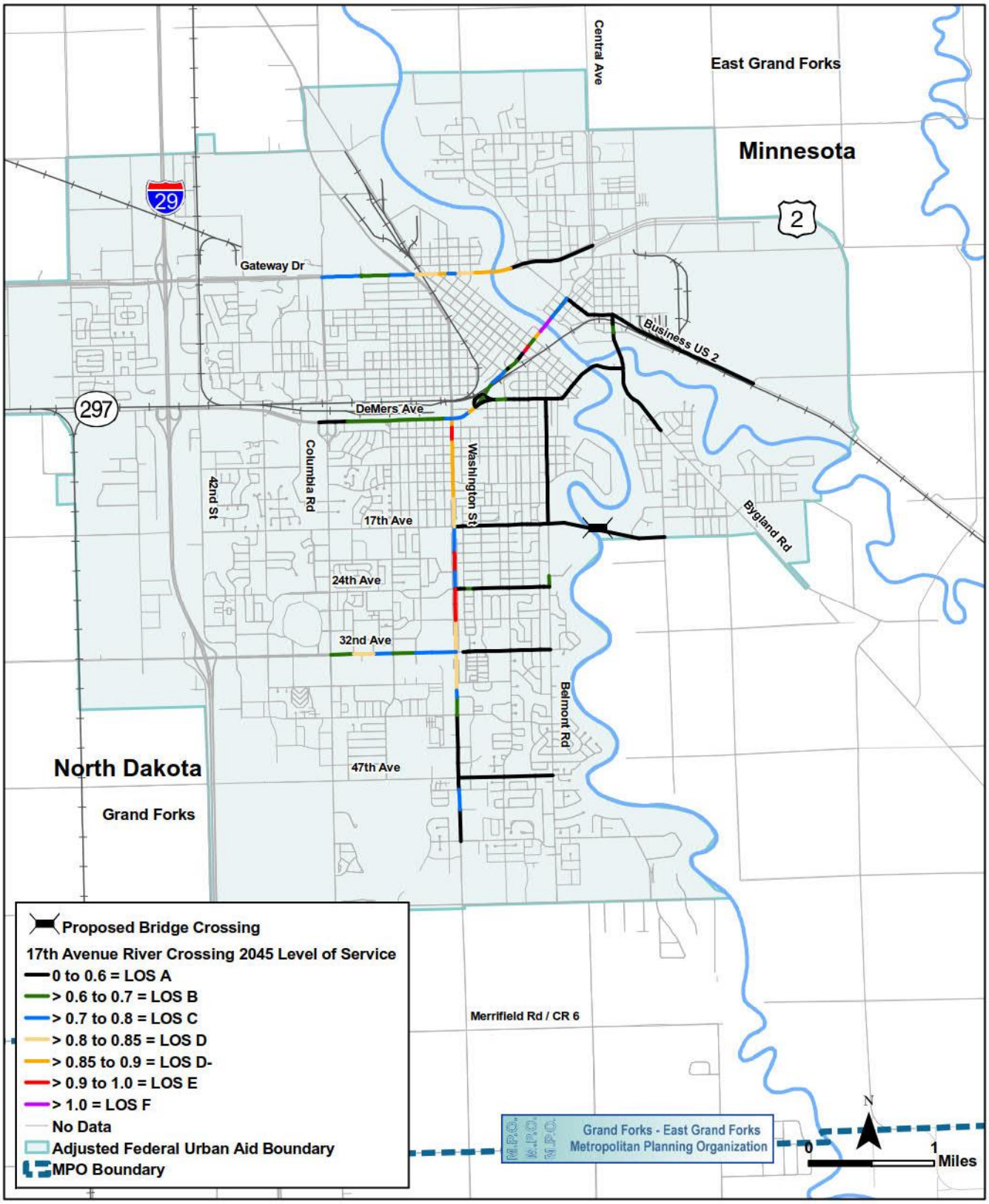


Figure 7: Link Level of Service Summary for the Proposed 17th Avenue S River Crossing

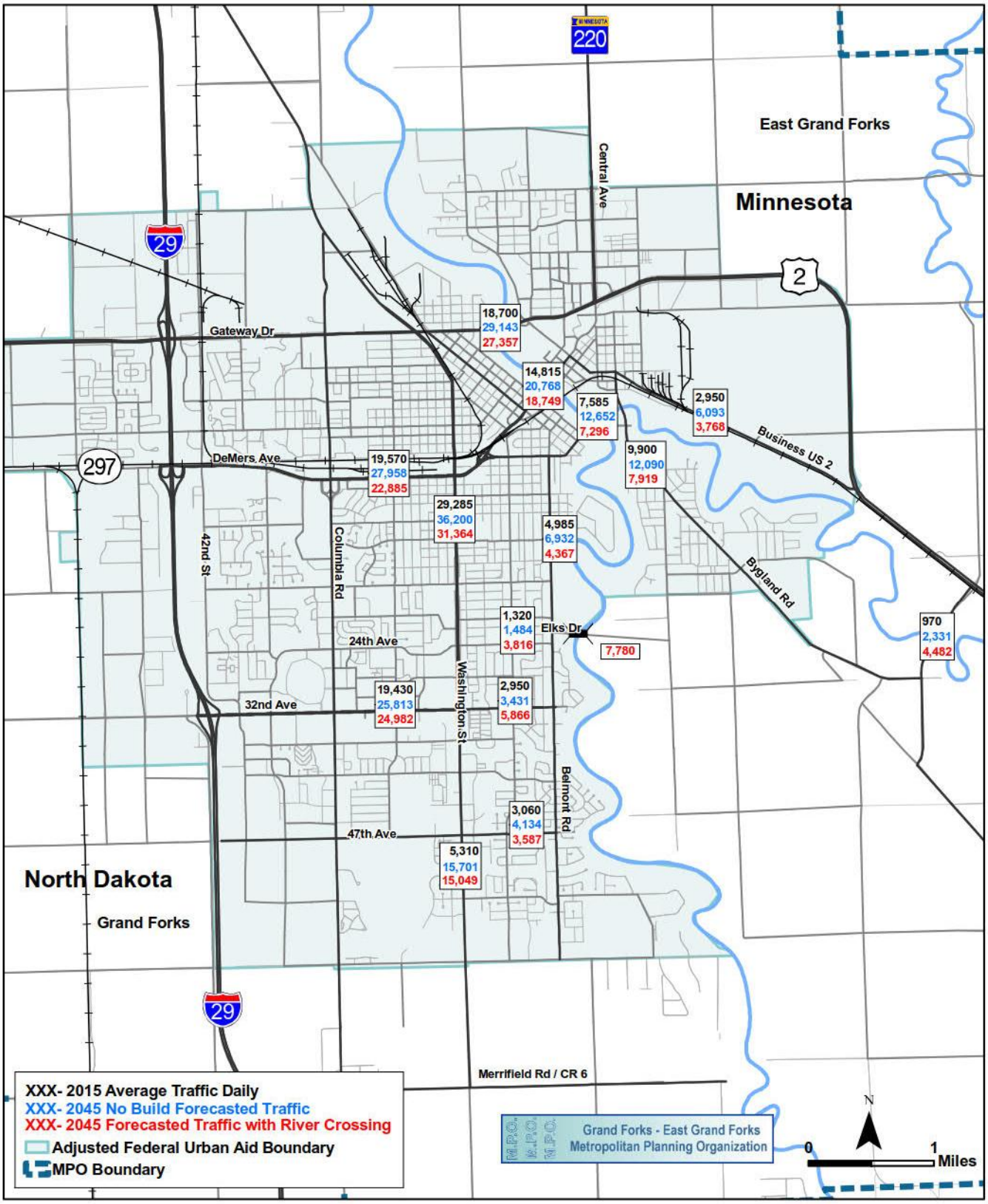


Figure 8: ADT Summary for the Proposed Elks Drive River Crossing

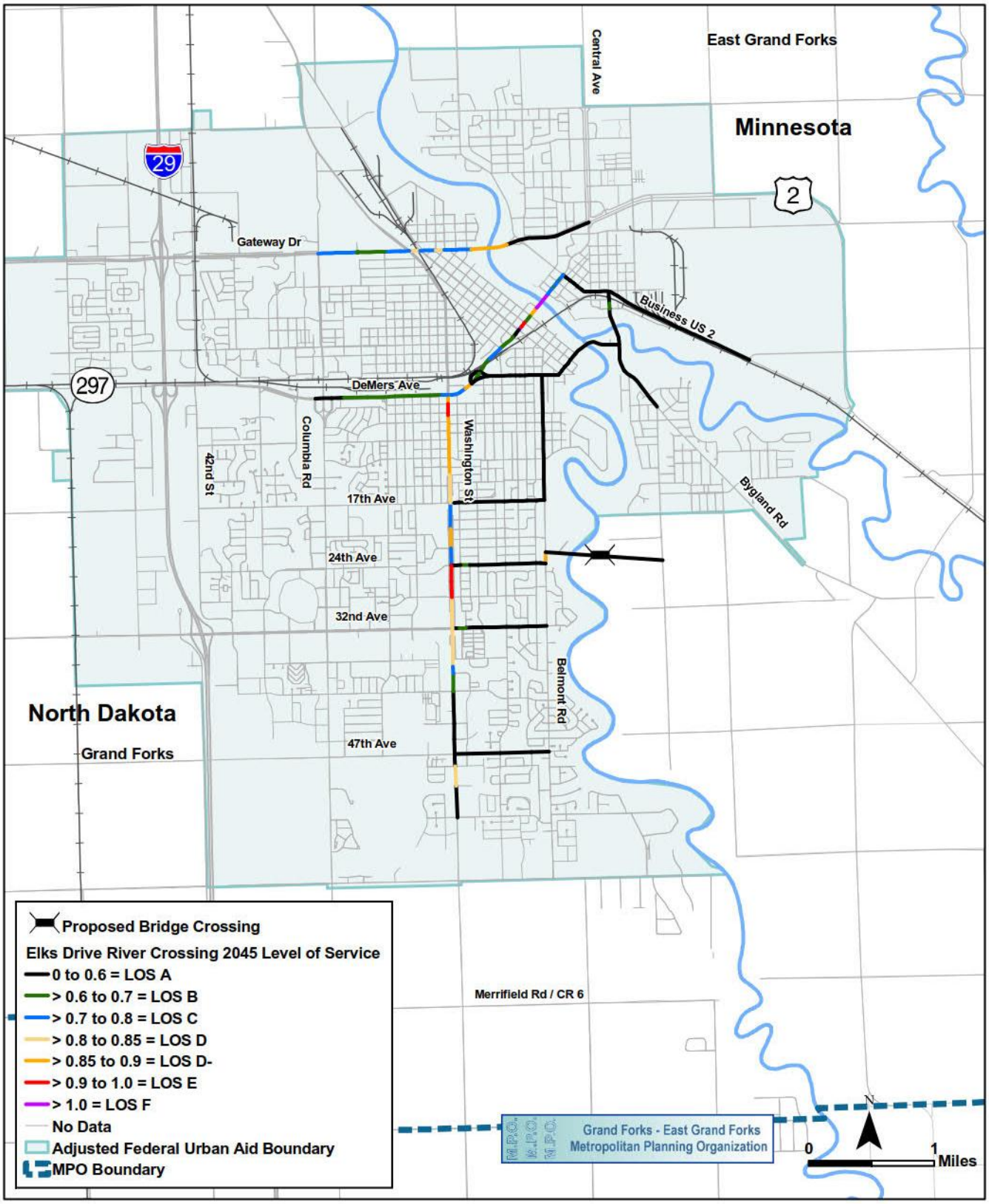


Figure 9: Link Level of Service Summary for the Proposed Elks Drive River Crossing

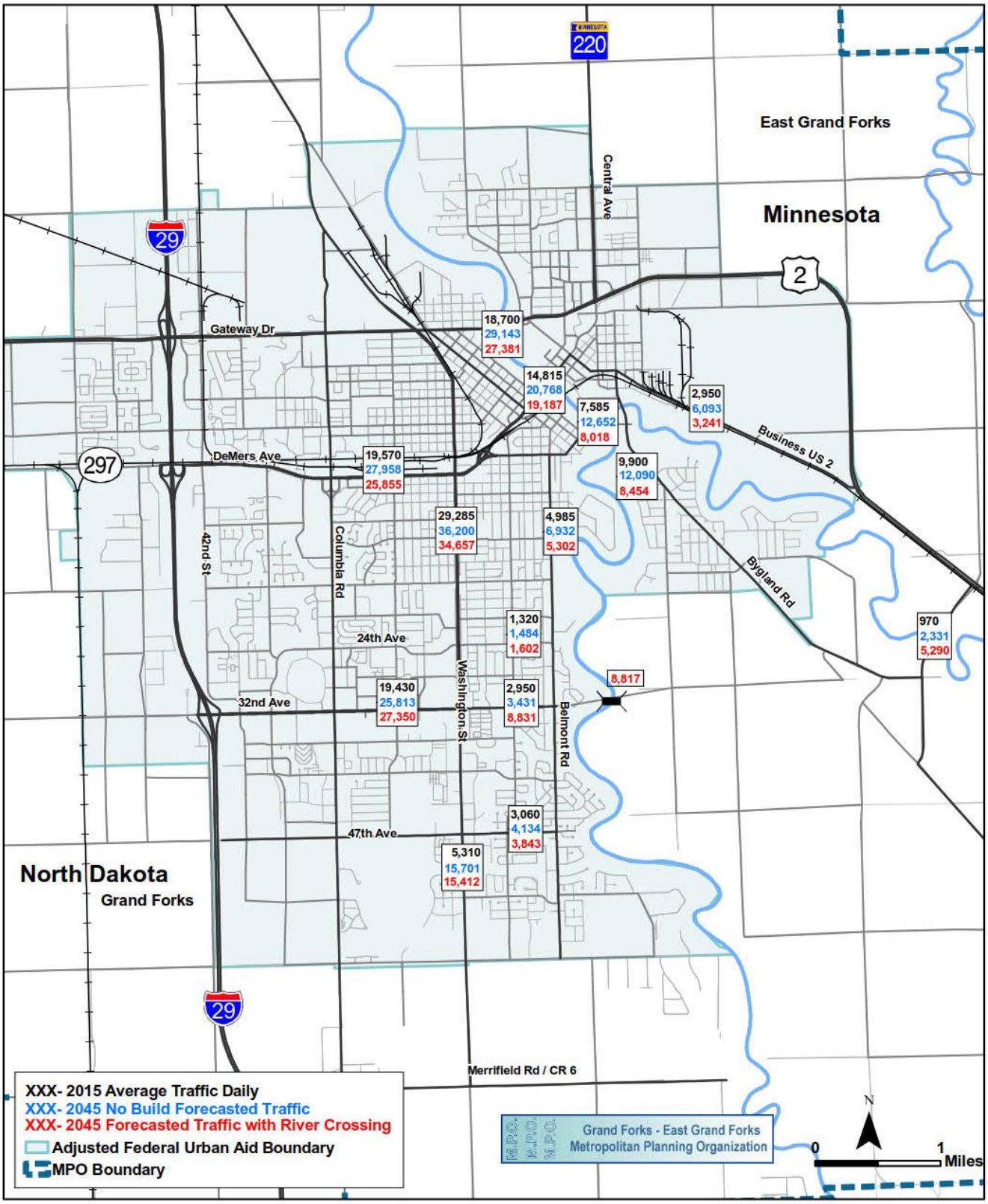


Figure 10: ADT Summary for the Proposed 32nd Avenue S River Crossing

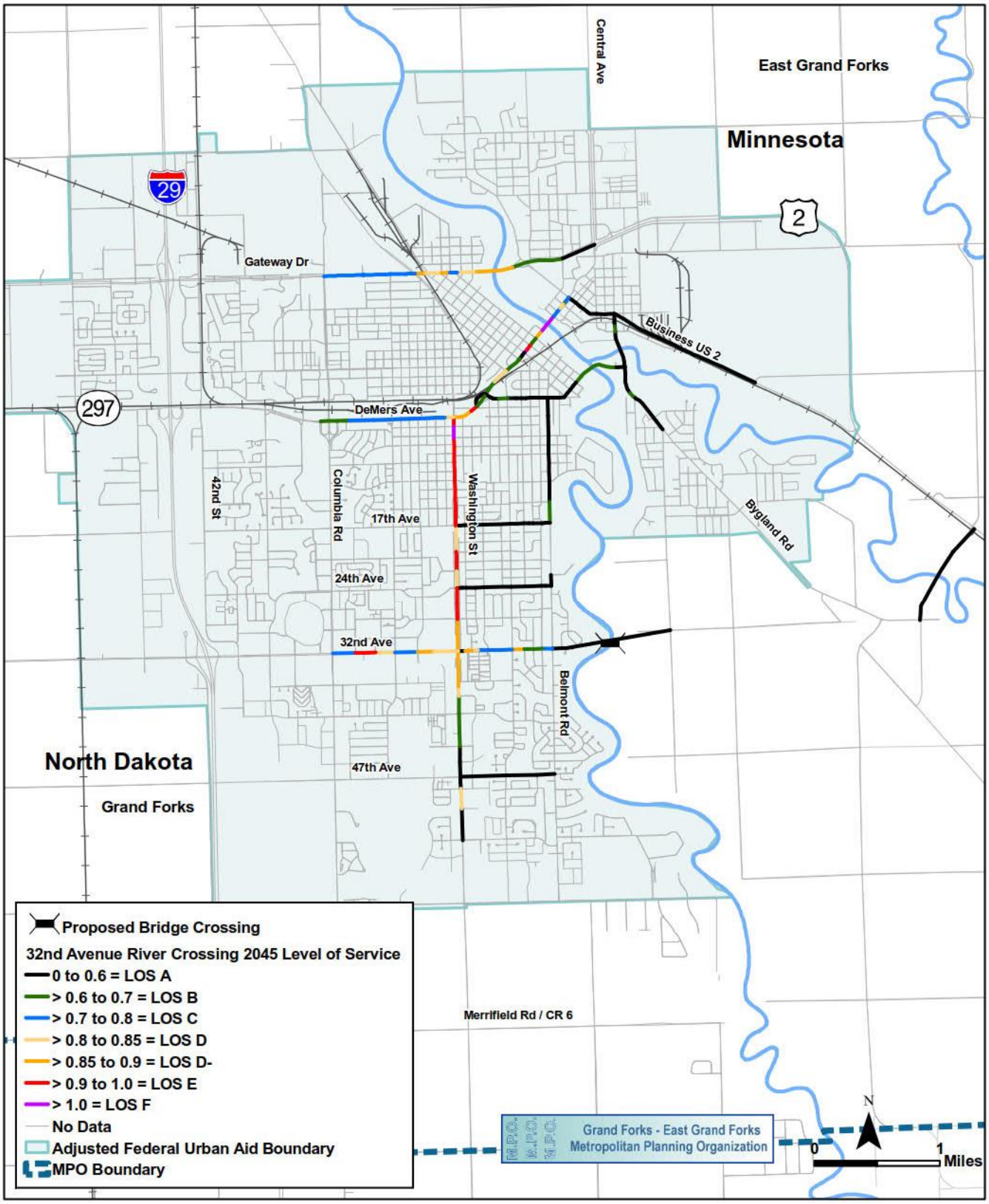


Figure 11: Link Level of Service Summary for the Proposed 32nd Avenue S River Crossing

Figure 12:ADT Summary for the Proposed 47th Avenue S River Crossing

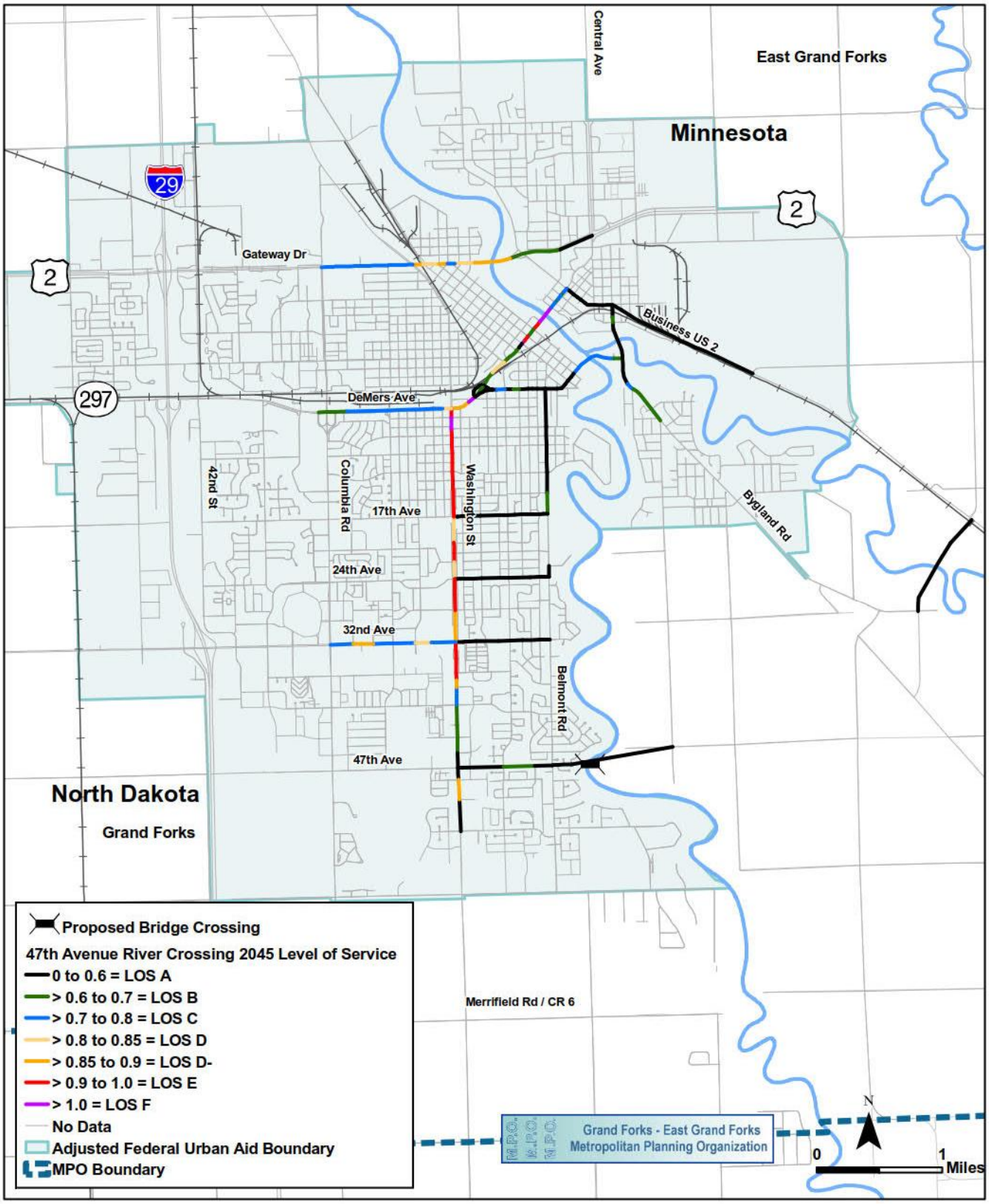


Figure 13: Link Level of Service Summary for the Proposed 47th Avenue S River Crossing

Figure 14: ADT Summary for the Proposed Merrifield Road River Crossing

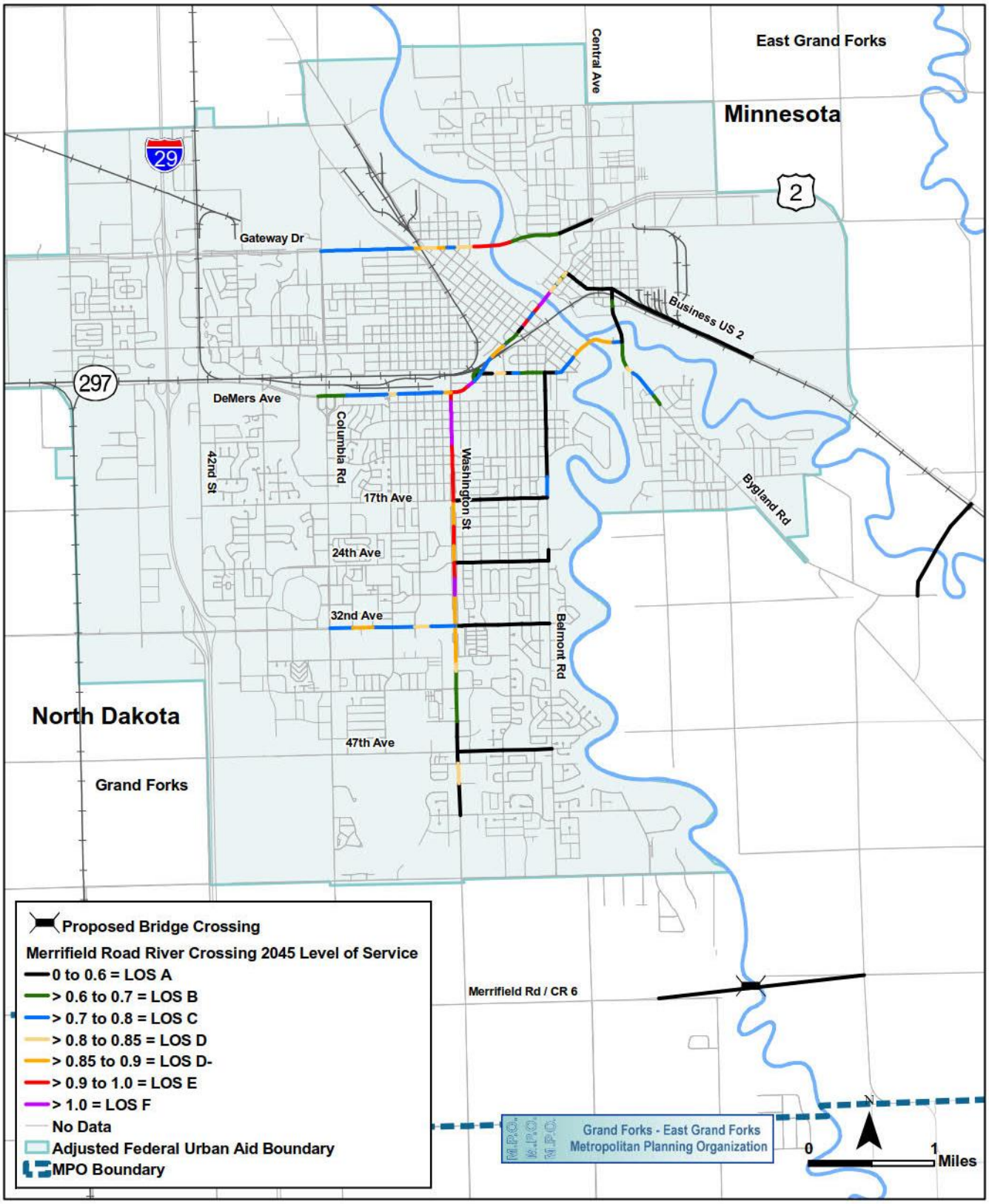


Figure 15: Link Level of Service Summary for the Proposed Merrifield Road River Crossing

The second part of the river crossing analysis looked at the same fifteen intersections analyzed under the Existing and No Build scenarios. Turning movement counts for each intersection and each river crossing scenario were created using the same methodology as for the No Build scenario. **Table 6** is a continuation of **Tables 4** and **5**. **Table 7** provides a comparison to the 2000 and 2025 intersection LOS results from the 2000 river crossing analysis to the 2018 and 2045 LOS results from the 2018 river crossing analysis. In general, there has been a general deterioration of LOS at all the intersections. Also, those intersections identified as having the most operational challenges in the 2000 analysis are also identified as having the most operational challenges under the 2018 analysis.

Table 6: Intersection LOS Summary

Intersection/Crossing Scenario	Existing PM Peak	2045 No Build PM Peak	2045 Build 17th Avenue S PM Peak	2045 Build Elks Drive Crossing	2045 Build 32nd Avenue S Crossing	2045 Build 47th Avenue S Crossing	2045 Build Merrifield Crossing
1st Street SE at 3rd Avenue SE	A	B	A	A	A	A	A
Greenway Boulevard SE, Bygland Road SE, 13th Street SE	A	C	F	F	B	B	C
Greenway Boulevard SE at Rhinehart Drive SE	A	A	A	A	A	A	A
DeMers Avenue at N 5th Street	B	B	B	B	B	B	B
DeMers Avenue at S Washington Street	D	E	D	D	E	E	E
S Washington Street at 17th Avenue S	C	D	D	C	D	D	D
S Washington Street at 24th Avenue S	C	D	C	D	D	D	D
S Washington Street at 32nd Avenue S	D	E	E	E	F	E	E
S Washington Street at 47th Avenue S	B	D	D	D	D	D	D
4th Avenue S at Belmont Road	B	F	C	B	C	C	F
17th Avenue S at Belmont Road	A	A	F	A	A	A	A
Elks Drive at Belmont Road	B	C	E	F	B	B	C
24th Avenue S at Belmont Road	A	A	C	F	A	A	A
32nd Avenue S at Belmont Road	B	F	F	F	F	C	E
47th Avenue S at Belmont Road	A	A	A	A	A	F	A

Table 7: Comparison between 2000 and 2018 River Crossing Analyses Intersection LOS

Intersection/Crossing Scenario	Existing PM Peak (2000)*	Existing PM Peak (2018)	2025 No Build PM Peak	2045 No Build PM Peak*
1st Street SE at 3rd Avenue SE	A	A	D-E	B
DeMers Avenue at S Washington Street	E	D	F	E
S Washington Street at 17th Avenue S	C	C	A-C	D
S Washington Street at 32nd Avenue S	C	D	F	E
S Washington Street at 47th Avenue S	N/A	B	A-C	D
17th Avenue S at Belmont Road	N/A	A	A-C	A
32nd Avenue S at Belmont Road	N/A	B	A-C	F

* - values from 2000 river crossing analysis

For the intersection analysis, there are some differences between the river crossing alternatives. **Figure 16** on the following page summarizes the overall intersection LOS for each of the analyzed river crossings including Existing and No Build conditions.

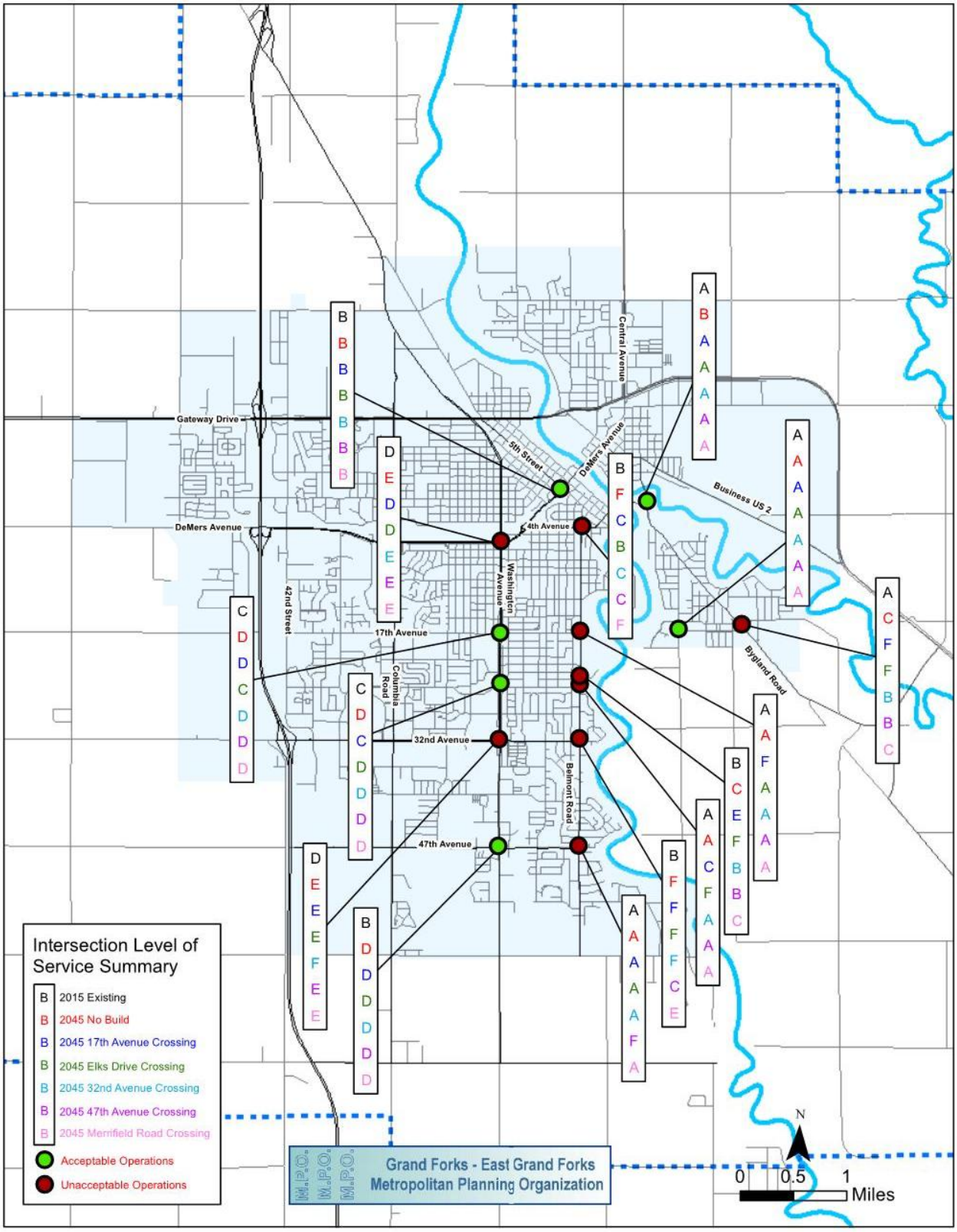


Figure 16: Intersection LOS Summary

Intersection Mitigation

As part of the river crossing intersection level of service analysis, mitigation for each intersection were analyzed to determine what if any mitigation techniques could be employed to bring all analyzed intersection to LOS D or better. As part of the mitigation process, the following mitigation hierarchy was established:

- Add turn lanes within existing ROW
- Intersection control modifications and/or add turn lanes that require additional ROW
- Alternative intersection design

Each intersection that operated at LOS E or LOS F under any of the 2045 Build scenarios, was analyzed using the hierarchy above to determine the most feasible mitigation. In most cases the worst-case river crossing scenario was similar to the No Build 2045 LOS. **Table 8** below summarizes the mitigations.

Based on the mitigations in **Table 8**, two intersections could not be reasonably mitigated with strategies from the mitigation hierarchy described above. The following innovative intersection solutions are recommended for further consideration at these locations:

- S Washington Street and DeMers Avenue – continuous flow intersection (see **Figure 17)**.

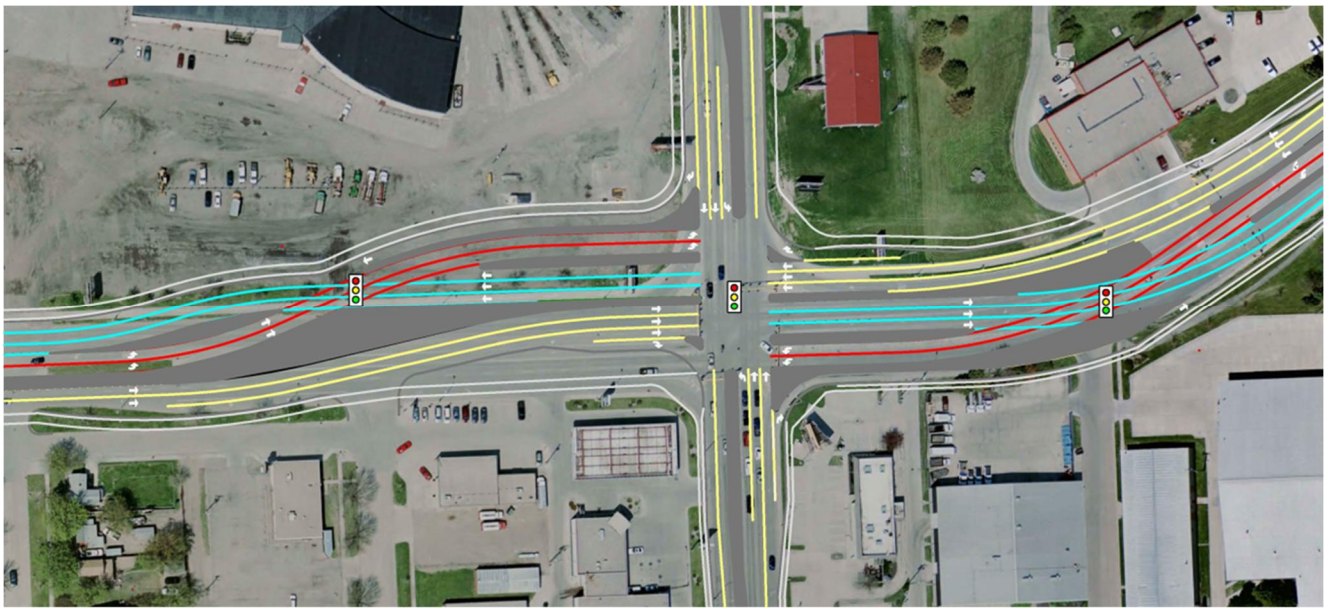


Figure 17: Continuous Flow Intersection Concept at S Washington Street and Demers Avenue

Table 8: Mitigated 2045 Build LOS Summary

Intersection/Crossing Scenario	Existing Intersection Control	Unmitigated LOS	Mitigated Control	Mitigated LOS	Mitigation Summary
Greenway Boulevard,13th Street SE at Bygland Road	Two-Way Stop	F[1]	Traffic Signal / Roundabout	B	A conventional single lane roundabout would also result in acceptable operations. Also, could convert to a signal.
S Washington Street at DeMers Avenue	Traffic Signal	E[5]	Traffic Signal	D	Additional lanes are required and that is not very feasible given existing right-of-way using a conventional intersection improvement. Conversion to a continuous flow intersection showed benefit in 2013 analysis.
S Washington Street at 32nd Avenue S	Traffic Signal	F[3]	Traffic Signal	NA	Additional lanes are required and that is not very feasible given existing right-of-way using a conventional intersection improvement.
4th Avenue S at Belmont Road	All-Way Stop	F[5]	Mini-Roundabout / Traffic Signal	B	Based on a high-level volume analysis, a mini-roundabout is also anticipated to operate at an acceptable LOS. Also, could convert to a signal.
17th Avenue S at Belmont Road	Two-Way Stop	F[1]	Traffic Signal	C	Convert to a signal.
24th Avenue S at Belmont Road	Two-Way Stop	F[2]	Traffic Signal	B	Convert to a signal.
Elks Drive at Belmont Road	Two-Way Stop	F[2]	Traffic Signal	B	Convert to a signal. The WB approach also requires a left turn lane and a right turn lane. Right-of-way will need to be acquired to accommodate the WB approach widening.
32nd Avenue S at Belmont Road	All-Way Stop	F[3]	Traffic Signal	C	Convert to a signal and add a EB and NB left. Widening on downstream approaches will be required to reduce skew through the intersection.
47th Avenue S at Belmont Road	Two-Way Stop	F[4]	Traffic Signal	B	Convert to a signal and add a left turn lane on the NB/SB/WB approaches. Widening and urban street cross section will be required on the NB approach.

1. Worst intersection LOS under 17th Avenue S River Crossing
2. Worst intersection LOS under Elks Drive River Crossing
3. Worst intersection LOS under 32nd Avenue S River Crossing
4. Worst intersection LOS under 47th Avenue S River Crossing
5. Worst intersection LOS under Merrifield Road Crossing

Regional Impacts

One goal of a new river crossing is to alleviate the anticipated congestion on the existing crossings by providing users an alternate route. **Table 9** summarizes the ADTs by scenario for each of the existing and proposed river crossings. Many of the river crossing scenarios have similar results from a traffic volume perspective, although there is generally a decrease in the river crossing volume served by the proposed river crossing as it moves further to the south. There are also some notable decreases in traffic volumes on the Minnesota Avenue / 1st Street SE crossing under the 17th Avenue S, Elks Drive, 32nd Avenue S and 47th Avenue S scenarios.

Table 9: Forecast River Crossing ADTs Summary

River Crossing Location	Existing	2045 No Build	2045 with 17th Crossing	2045 with Elks Crossing	2045 with 32nd Crossing	2045 with 47th Crossing	2045 with Merrifield Crossing
US 2	18,700	29,100	27,700	27,400	27,400	27,800	28,300
DeMers Avenue	14,800	20,800	18,900	18,800	19,200	19,400	20,300
Minnesota Avenue / 1st Street SE	7,600	12,700	7,500	7,300	8,000	9,300	11,100
17th Avenue S	--	--	8,000	--	--	--	--
Elks Drive	--	--	--	7,800	--	--	--
32nd Avenue S	--	--	--	--	8,800	--	--
47th Avenue S	--	--	--	--	--	7,600	--
Merrifield Road	--	--	--	--	--	--	3,600
Total ADT	41,100	62,600	62,100	61,300	63,400	64,100	63,300

Table 10 summarizes the net difference between each scenario at the Red River crossings as compared to No Build.

Table 10: Net ADT Change by Red River Crossing as Comparted to No Build ADT

River Crossing Location	2045 with 17th Crossing	2045 with Elks Crossing	2045 with 32nd Crossing	2045 with 47th Crossing	2045 with Merrifield Crossing
US 2	-1,400	-1,700	-1,700	-1,300	-800
DeMers Avenue	-1,900	-2,100	-1,600	-1,400	-500
Minnesota Avenue / 4th Avenue S/ 1st Street SE	-5,200	-5,400	-4,700	-3,400	-1,600
17th Avenue S	8,000	--	--	--	--
Elks Drive	--	7,800	--	--	--
32nd Avenue S	--	--	8,800	--	--
47th Avenue S	--	--	--	7,600	--
Merrifield Road	--	--	--	--	3,600
Net ADT Difference	-600	-1,400	800	1,500	700

Table 11 below summarizes the link LOS at each river crossing for each scenario.

Table 11: River Crossing Link LOS by Scenario

River Crossing Location	2045 No Build	2045 with 17th Crossing	2045 with Elks Crossing	2045 with 32nd Crossing	2045 with 47th Crossing	2045 with Merrifield Crossing
US 2	E	D -	D -	D	D	E
DeMers Avenue	F	F	F	F	F	F
Minnesota Avenue / 4th Avenue S/ 1st Street SE	E	A	A	B	C	D
17th Avenue S	--	A	--	--	--	--
Elks Drive	--	--	A	--	--	--
32nd Avenue S	--	--	--	A	--	--
47th Avenue S	--	--	--	--	A	--
Merrifield Road	--	--	--	--	--	A

Based on **Tables 9** through **11**, there is no one river crossing location that will solve all the issues shown under the No Build scenario. The improvement of the link LOS on Minnesota Avenue / 4th Avenue S/ 1st Street SE and Gateway Drive (US 2) for the 17th Avenue S, Elks Drive, 32nd Avenue S and 47th Avenue S proposed river crossings is notable.

Table 12 summarizes the ADT link volumes on Bygland Road and TH 220 for each of the scenarios analyzed.

Table 13 summarizes the net difference between each scenario as compared to No Build on Bygland Road and TH 220.

Reviewing two of the primary roadways that would provide access between East Grand Forks to the proposed Red River crossing, TH 220 over the Red Lake River and Bygland Road north of Rhinehart Drive, also provides insight as to the impacts on local and regional traffic for each of the alternatives analyzed. **Tables 12** and **13** shows that daily traffic on Bygland Road north of Rhinehart Drive will decrease more if the proposed 17th Avenue S, Elks Drive or 32nd Avenue S river crossings are constructed. Conversely the TH 220 daily traffic would be highest if the 32nd Avenue S or 47th Avenue S river crossings were constructed. This relationship indicates that the northern crossing alternatives serve more local trips and the southern crossings serve more regional trips, although all crossings will have each trip type. The results shown in **Table 13** are also shown in **Figures 18** and **19** for TH 220 River Crossing and Bygland Road N. of Rhinehart Drive, respectively.

Table 12: Forecast ADTs on Bygland Road and TH 220 Summary

River Crossing Location	Existing	2045 No Build	2045 with 17th Crossing	2045 with Elks Crossing	2045 with 32nd Crossing	2045 with 47th Crossing	2045 with Merrifield Crossing
TH 220 River Crossing	970	2,330	4,240	4,480	5,290	5,340	3,520
Bygland Road N. of Rhinehart Dr.	9,900	12,090	7,450	7,920	8,450	10,110	11,420

Table 13: Net ADT Change on Bygland Road and TH 220 as Comparted to No Build ADT

River Crossing Location	2045 with 17th Crossing	2045 with Elks Crossing	2045 with 32nd Crossing	2045 with 47th Crossing	2045 with Merrifield Crossing
TH 220 River Crossing	+1,910	+2,150	+2,960	+3,010	+1,190
Bygland Road N. of Rhinehart Dr.	-4,640	-4,170	-3,600	-1,980	-680

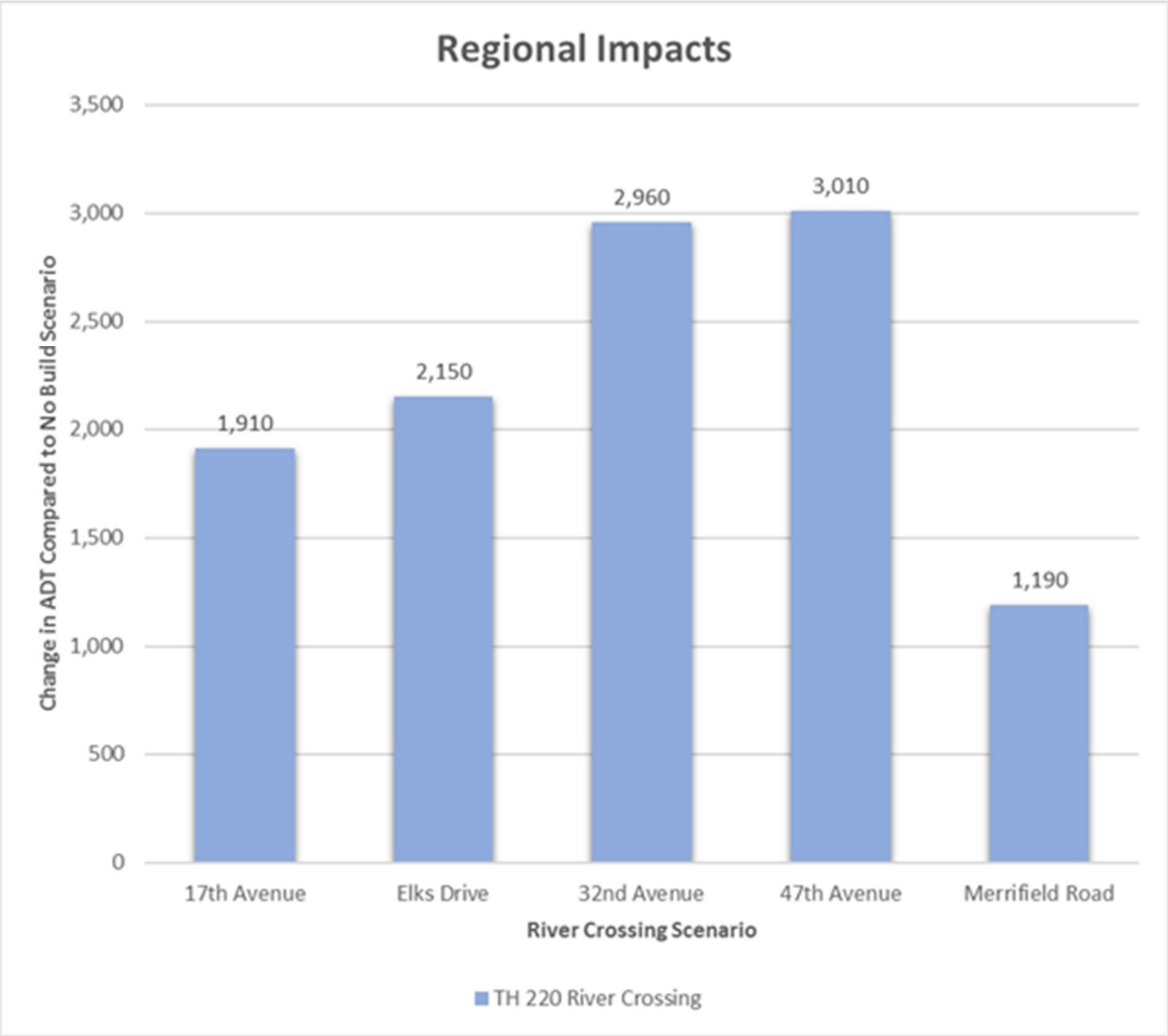


Figure 18: Change in traffic volumes on TH 220 at Red Lake River by River Crossing Scenario

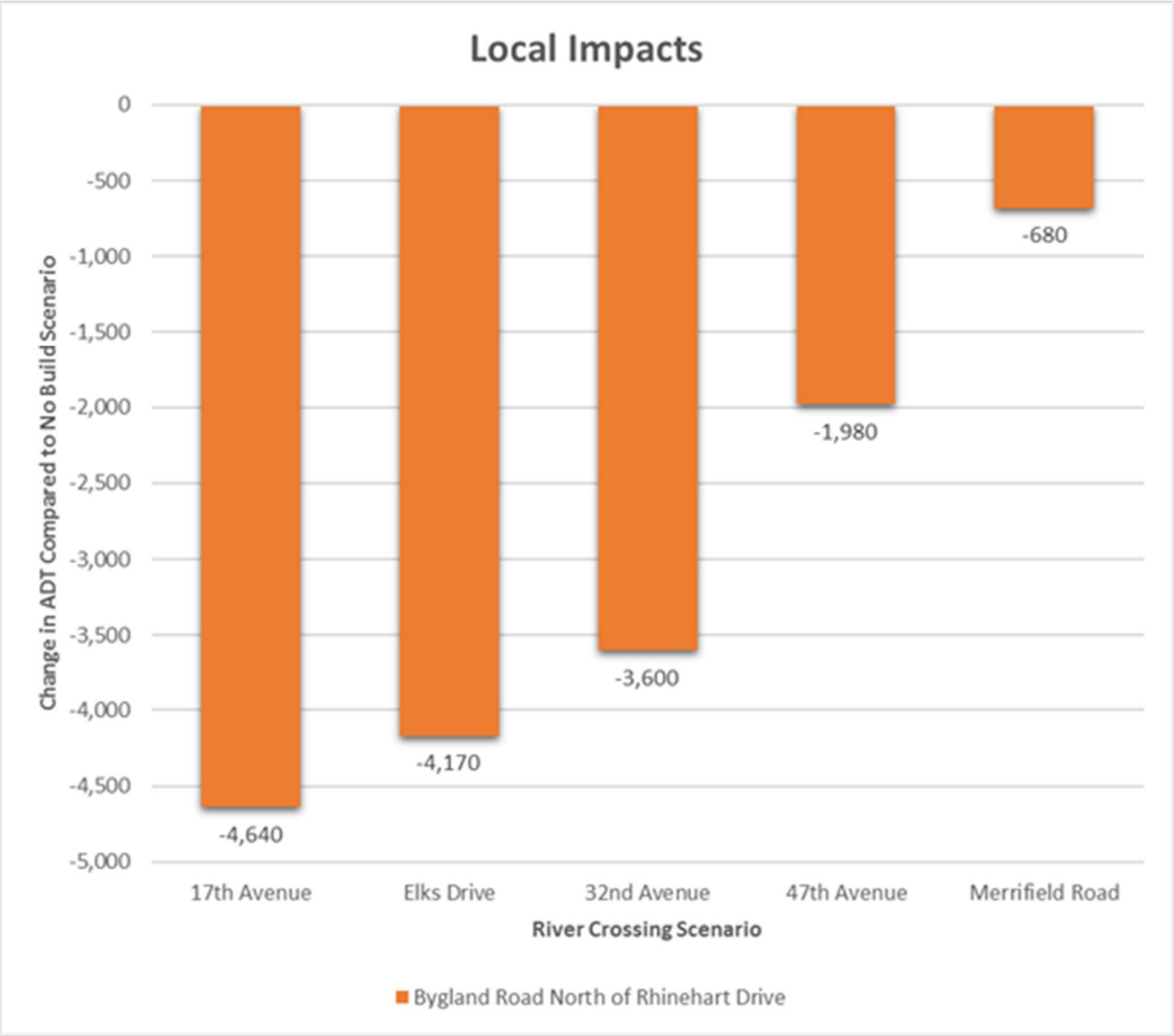


Figure 19: Change in traffic volumes on Bygland Road, North of Rhinehart Drive by River Crossing Scenario

The travel demand model generates several measures of effectiveness on a network basis that allows for a comparison between the various river crossing scenarios including total vehicle miles traveled (VMT) and total vehicle hours traveled (VHT). Comparing the values of these measures for each scenario provides a better understanding of which alternatives reduces travel time and travel distance. Reducing the values of these measures is desirable because additional VHT is typically due to delay, additional travel time required to avoid areas of delay, or additional travel time because a more direct route is not available. For this analysis, adding a river crossing could serve some travelers more directly and allow for reduced delay and distance traveled on their trip. Conversely, some drivers may travel slightly out of their way to avoid delay that is typically experienced on an existing crossing and that could increase VMT and decrease VHT. Delay adds stress to drivers, additional costs for businesses, increased fuel consumption, and higher vehicle emissions. The benefits of lower VMT are similar to VHT although VHT can be tied more directly to driver impacts and costs where VMT is more directly associated to impacts on emissions and fuel consumption.

Tables 14 and **15**, on the following pages, summarizes the urban VMT and VHT totals for each river crossing scenario by roadway classification and the differences in VMT as compared to the 2045 No Build scenario for all alternatives. **Table 16** summarizes the differences in VHT as compared to the 2045 No Build scenario for all alternatives. Below are a few observations that can be made after reviewing these network measures:

- **17th Avenue S River Crossing:** Increases "Lower Functionally Classified VMT" the most of any alternative (+9,358) and has the third greatest reduction in "Higher Functionally Classified VMT" (-19,770). VHT is reduced the most of any alternative with the 17th Avenue S Crossing (-12,374).
- **Elks Drive River Crossing:** Increases "Lower Functionally Classified VMT" by +4,627 and has the greatest reduction in "Higher Functionally Classified VMT" (-24,371). VHT is reduced the second most of any alternative with the Elks Drive Crossing at -12,254.
- **32nd Avenue S River Crossing:** Decreases "Lower Functionally Classified VMT" by -1,321 and has the second greatest reduction in "Higher Functionally Classified VMT" (-23,418). VHT is slightly reduced under the 32nd Avenue S Crossing (-831).
- **47th Avenue S River Crossing:** Increases "Lower Functionally Classified" by +717 and decreases "Higher Functionally Classified VMT" by -14,362. VHT is increased slightly with the 47th Avenue S Crossing (+174).

  Merrifield Road River Crossing: Decreases "Lower Functionally Classified VMT" the most of any alternative (-4,226) and "Higher Functionally Classified VMT" is decreased by -16,098. VHT is reduced the second most of any alternative (-679).

Table 14: Urban VMT and VHT Total per River Crossing

Facility Type	2045 No Build Network	17th Avenue S River Crossing	Elks Drive River Crossing	32nd Avenue S River Crossing	47th Avenue S River Crossing	Merrifield Road River Crossing
Freeways and Ramps	101,186	96,052	99,381	97,132	98,524	100,016
Major Arterials	530,889	516,807	513,467	511,543	519,441	518,568
Minor Arterials	237,590	237,036	232,446	237,572	237,338	234,983
Collectors	139,010	149,801	149,570	138,905	140,997	138,876
Local Streets/Rural	46,109	45,230	45,320	44,911	45,091	44,624
Urban VMT Totals	**1,054,784**	**1,044,926**	**1,040,184**	**1,030,063**	**1,041,391**	**1,037,067**
Total VHT	**59,702**	**47,328**	**47,448**	**58,871**	**59,876**	**59,023**

Table 15: Urban VMT Difference from 2045 No Build

Facility Type	2045 No Build	17th Avenue S River Crossing	Elks Drive River Crossing	32nd Avenue S River Crossing	47th Avenue S River Crossing	Merrifield Road River Crossing
Freeways and Ramps	101,186	-5,134	-1,805	-4,054	-2,662	-1,170
Major Arterials	530,889	-14,082	-17,422	-19,346	-11,448	-12,321
Minor Arterials	237,590	-554	-4,590	-18	-252	-2,607
Collectors	139,010	+10,791	+10,560	-105	1,987	-134
Local Streets/Rural	46,109	-879	-789	-1,198	-1,018	-1,485
Total VMT Reduction Compared to 2045 No Build	**1,054,784**	**-9,858**	**-14,600**	**-24,721**	**-13,393**	**-17,717**
Freeways, Ramps, Major Arterials VMT Compared to 2045 No Build	**869,665**	**-19,770**	**-24,371**	**-23,418**	**-14,362**	**-16,098**
Minor Arterials, Collectors, Local VMT Compared to 2045 No Build	**422,709**	**9,358**	**4,627**	**-1,321**	**717**	**-4,226**

Table 16: VHT Difference from 2045 No Build

Facility Type	2045 No Build Network	17th Avenue S River Crossing	Elks Drive River Crossing	32nd Avenue S River Crossing	47th Avenue S River Crossing	Merrifield Road River Crossing
Total VHT Reduction Compared to 2045 No Build	**59,702**	**-12,374**	**-12,254**	**-831**	**174**	**-679**

Conclusions

A regional and local level analysis was completed for five potential river crossing locations. The analysis included a link LOS analysis, intersection LOS analysis, and comparison of river crossing volumes and network wide VMT and VHT under Existing (2017), No Build (2045), and the five potential river crossing scenarios (2045). All intersection LOS analysis was completed for PM peak conditions.

Under Existing conditions, there are minimal issues within the analysis area. Under 2045 No Build conditions all three existing river crossings in addition to segments of Washington Street and 32nd Avenue S are anticipated to operate at LOS E or F. The intersections of S Washington Street and DeMers Avenue, S Washington Street and 32nd Avenue S, 4th Avenue S and Belmont Road, and 32nd Avenue S and Belmont Road also show undesirable operations under 2045 No Build conditions (LOS E or F). All three existing river crossings are anticipated to operate at an unacceptable LOS under 2045 No Build conditions.

A review of the daily traffic forecasts on Bygland Road north of Rhinehart Drive and the TH 220 Red Lake River crossing indicates that the northern crossing alternatives serve more local trips and the southern crossings serve more regional trips, although all crossings will have each trip type. Based on the information provided in **Tables 12** and **13**, a few conclusions can be made.

- There is an increase of about 2,000 vehicles per day at the TH 220 river crossing under the 17th Avenue S and Elks Drive crossings scenarios when compared to No Build. There is an increase of about 3,000 vehicles per day under the 32nd and 47th Avenue S crossings scenarios when compared to No Build. This increase is only 1,200 vehicles per day under the Merrifield Road Crossing scenario. TH 220 serves more regional trips since it is three miles from the edge of East Grand Forks. The higher volumes under the 32nd and 47th Avenue S crossing scenarios indicate that more regional trips are being pulled to those crossings as compared to the 17th Avenue S and Elks Drive Crossings. The fact that Merrifield Road has a lower forecast volume increase does not mean regional trips will not be the primary user but rather that many that travel from the southeast on US 2 would travel a different route to the river crossing to avoid traveling out of their way to use the TH 220.
- The traffic forecasts on Bygland Road N decrease under all river crossing scenarios but the amount of decrease is highest for the 17th Avenue S crossing and lowest for the Merrifield Crossing. Since Bygland Road N serves a higher proportion of local trips this suggest that under all crossing scenarios traffic is anticipated to decrease due to utilization of the proposed river crossing (i.e. trips will cross to the south and avoid downtown Grand Forks/East Grand Forks). Since the decrease is larger when the proposed crossing is farther north, an increased percentage of the local trips served under the northern river crossing scenarios is to be expected.

The ADTs on Belmont Road north of 17th Avenue S are anticipated to decrease under each river crossing scenario when compared to 2045 No Action volumes. These decreases range from about 2400 for the 17th Avenue S and Elks Drive crossings, 1600 for the 32nd Avenue S and 47th Avenue S crossings, and 600 under the Merrifield Road crossing.

A review of the link LOS analysis for the four river crossing alternatives yielded the following observations:

- The Point Bridge link LOS operates better under the 17th Avenue S, Elks Drive and 32nd Avenue S river crossing alternatives.
- Gateway Drive operates better under the 17th Avenue S, Elks Drive, 32nd Avenue S, and 47th Avenue S river crossings.
- DeMers Avenue experienced similar operations under each of the alternatives analyzed.
- Belmont Road operations were better under all the river crossing alternatives when compared to the No Build scenario.

Where the signalized intersection LOS analysis showed operational concerns under future conditions, mitigations were analyzed at each intersection generally following the below mitigation hierarchy:

- Add turn lanes within existing ROW
- Intersection control modifications and/or add turn lanes that require additional ROW

- Alternative intersection design

Below is a summary of each intersection that was mitigated and the associated mitigation.

- S Washington Street at DeMers Avenue – Additional lanes are required and that is not very feasible given existing right-of-way using a conventional intersection improvement. Conversion to a continuous flow intersection showed benefit in 2013 analysis.
- S Washington Street at 32nd Avenue S – Additional lanes are required and that is not very feasible given existing right-of-way using a conventional intersection improvement. A quadrant roadway has some merit, but additional analysis is required.
- 4th Avenue S at Belmont Road – Based on a high-level volume analysis, a mini-roundabout is also anticipated to operate at an acceptable LOS. Also, could convert to a signal.
- 17th Avenue S at Belmont Road – Convert to a signal.
- Greenway Boulevard/13th Street SE at Bygland Road – A conventional single lane roundabout would result in acceptable operations. Also, could convert to a signal.
- 24th Avenue S at Belmont Road – Convert to a signal.
- Elks Drive at Belmont Road – Convert to a signal. The WB approach also requires a left turn lane and a right turn lane. Right-of-way will need to be acquired to accommodate the WB approach widening.
- 32nd Avenue S at Belmont Road – Convert to a signal. Avoided adding left turn lanes because downstream widening would be required to avoid skew for through traffic through intersection.
- 47th Avenue S at Belmont Road – Convert to a signal and add a left turn lane on the NB/SB/WB approaches. Widening and urban street cross section will be required on the NB approach.

A review of the link LOS and ADTs on the actual river crossing shows:

- There are notable decreases in traffic volumes on the Minnesota Avenue / 4th Avenue S /1st Street SE crossing under the 17th Avenue S, Elks Drive, 32nd Avenue S and 47th Avenue S scenarios.
- There are improvements in the link LOS on Minnesota Avenue / 4th Avenue S / 1s Street SE and Gateway Drive (US 2) for the 17th Avenue S, Elks Drive, 32nd Avenue S and 47th Avenue S proposed river crossings.

A review of the network wide performance measures of VMT and VHT shows the following:

- **17th Avenue S River Crossing:** Shows the lowest reduction of any alternative, decreasing the total VMT by 9,858. VHT is reduced the most of any alternative with the 17th Avenue S Crossing (-12,374).
- **Elks Drive River Crossing:** Shows the third lowest reduction of any alternative, decreasing the total VMT by 14,600. VHT is reduced the second most of any alternative with the Elks Drive Crossing at -12,254.
- **32nd Avenue S River Crossing:** Shows the largest decrease of any alternative, decreasing the total VMT by 24,721. VHT is slightly reduced under the 32nd Avenue S Crossing (-831).
- **47th Avenue S River Crossing:** Shows the 4th lowest reduction of any alternative, decreasing the total VMT by 13,393. VHT is increased slightly with the 47th Avenue S Crossing (+174).
- **Merrifield Road River Crossing:** Shows the 2nd lowest decrease of any alternative, decreasing the total VMT by 17,717 VHT is reduced the second most of any alternative (-679).

Red River Crossing Alignment Concept Development

It is important to understand at a planning level the cost differences between the alternatives because traffic operations and changes in traffic patterns are only one piece of the equation. A review of a cost benefit ratio of alternatives is one method that allows for both the cost and transportation system impacts of each crossing alternative to be compared.

As part of the 2025 Grand Forks-East Grand Forks Transportation Plan Update, Red River crossing concepts were developed for 17th Avenue S, Elks Drive, 32nd Avenue S, and Merrifield Road. In 2005, there was a more detailed review of the Merrifield River Crossing completed as part of the "Merrifield Road Red River Bridge Feasibility Study" (Feasibility Study). The 17th Avenue S, Elks Drive and 32nd Avenue S Crossings each had two main alternatives: "high and dry" and "low" alternative. The high and dry alternative raised the elevation of the low steel on the bridge to three feet above the 210-year flood elevation. The lower alternatives more closely followed the alignment of the existing ground to reduce construction costs, although under this alternative there is a high likelihood of seasonal flooding.

The scope of this project is to build off the work that has been completed in the past to provide similar comparisons between the river crossings to allow decision-makers to provide input on river crossing location preferences at a planning level.

Concept level river crossing location exhibits were developed to show the potential river crossing horizontal alignment for each of alternative. These alignments generally follow previously developed concept alignments except for the following:

- 17th Avenue S previously ran on a nearly east-west alignment. 17th Avenue S starts at roughly the same location on the west side of the Red River but curves to the south on the Minnesota side of the river to avoid impacts to homes that have been constructed since the prior analysis was completed.
- Elk Drive is similar except on the west end the existing Elks Drive alignment is used as opposed to the prior alignment that ran in a northwest to southeast orientation.
- In the 2025 Plan, there were three alternative alignments shown for the 32nd Avenue S river crossing. The option that brought the east end of the roadway within the dike system was selected for this analysis.
- 47th Avenue S was not previously reviewed. There was interest as part of this analysis to review this additional potential river crossing location. The alignment will run east from 47th Avenue S over the Red River and then turn to the northeast to ultimately connect near the intersection of Rhinehart Drive/445th Avenue SW and 200th Street SW. This analysis only includes a low concept because a high and dry concept would likely require extending the dike system in Minnesota approximately one mile to the south.
- For Merrifield Road, the alignment was like alignment 1A in the Feasibility Study.

Since this is an area wide transportation plan, concept drawings are not allowed to show engineering level details This is required because further analysis such as bridge feasibility studies and environmental documents will be required to analyze a river crossing location that is selected to move forward. Those documents are the appropriate place to analyze these crossing with this additional detail.

Figures 20–24 show the alignments for each river crossing that were used to completed the cost benefit analysis.

Figure 20: Potential Red River Crossing Alignment at 17th Avenue S

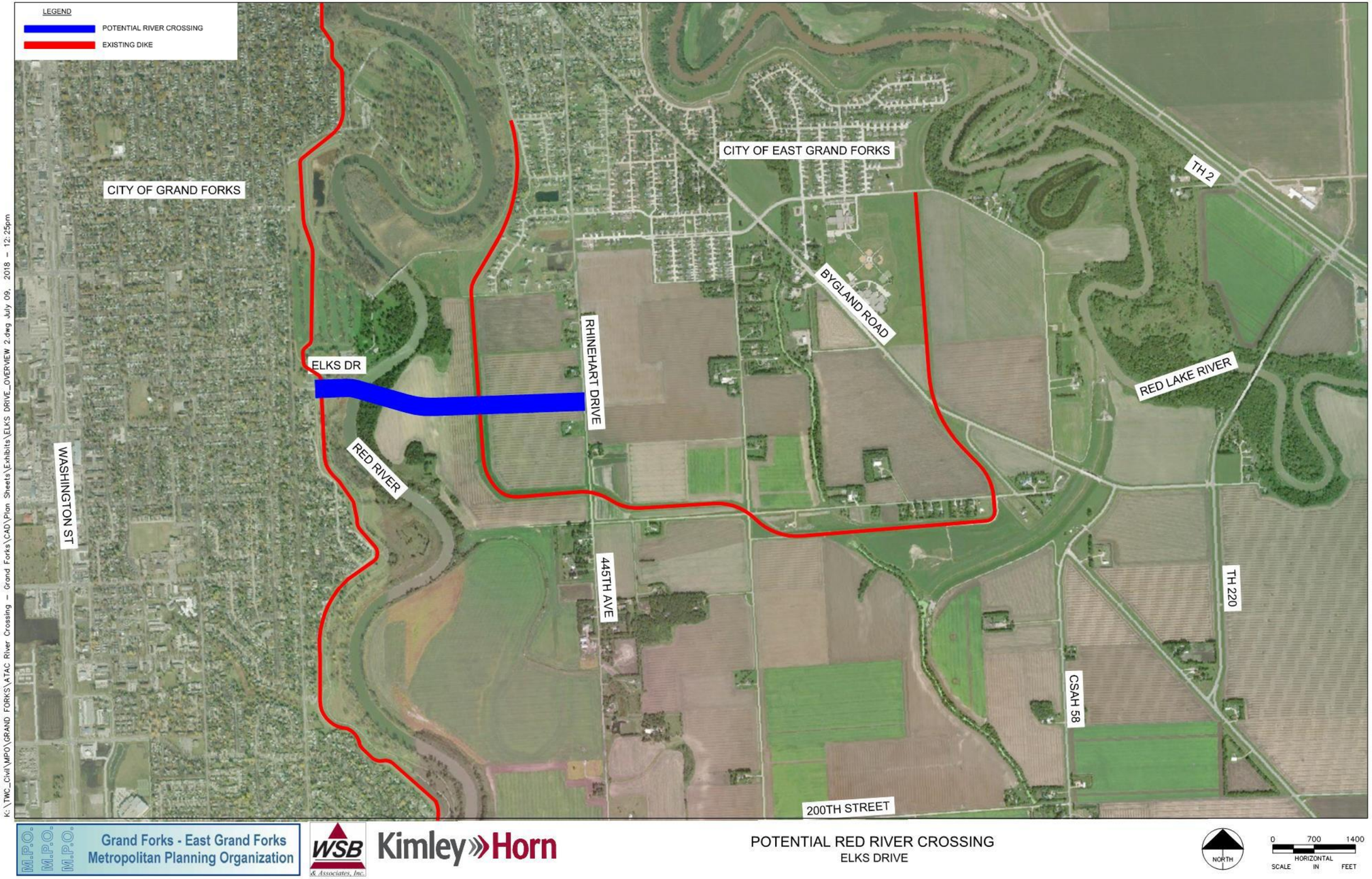


Figure 21: Potential Red River Crossing Alignment at Elks Drive

Figure 22: Potential Red River Crossing Alignment at 32nd Avenue S

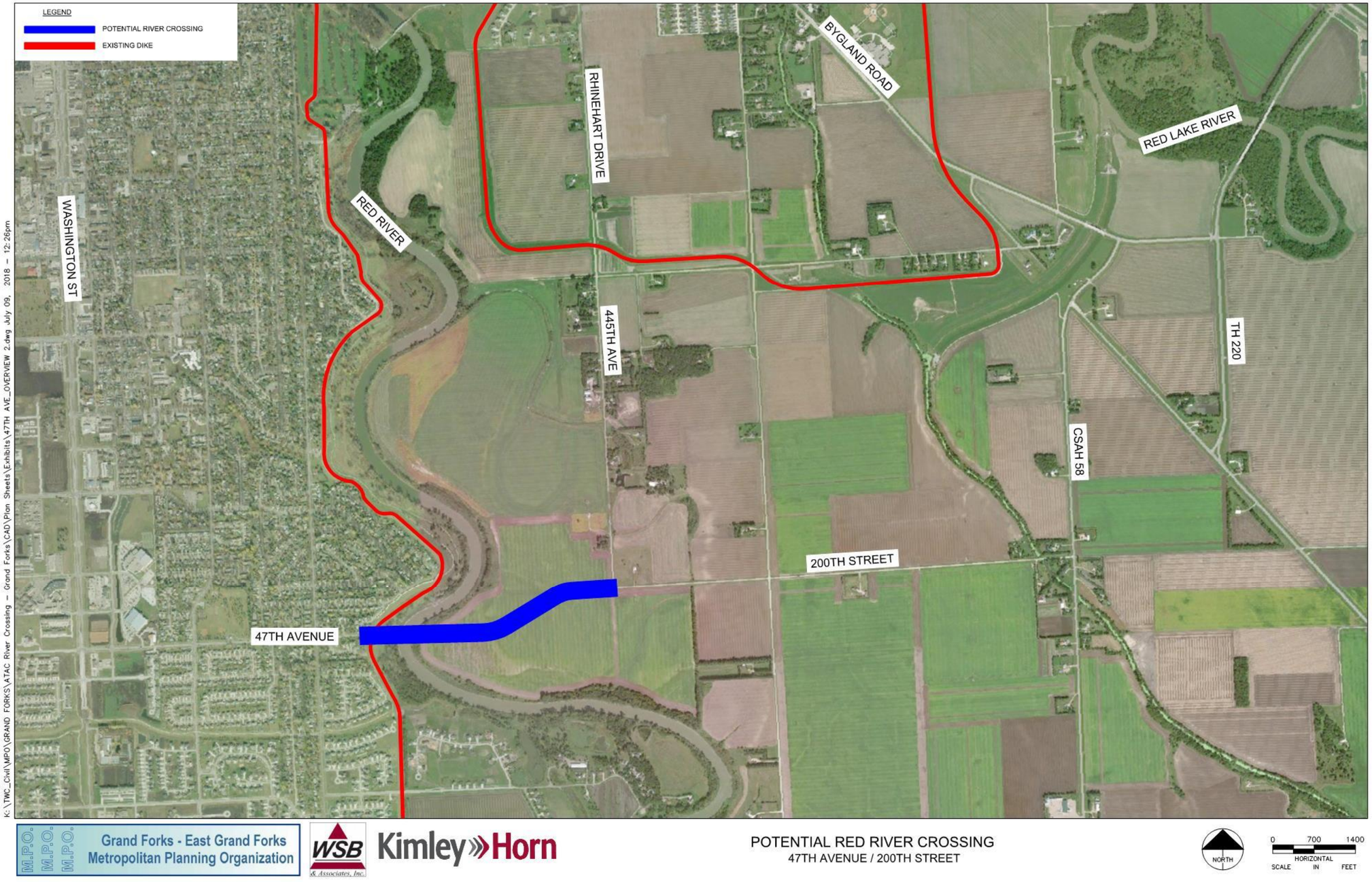
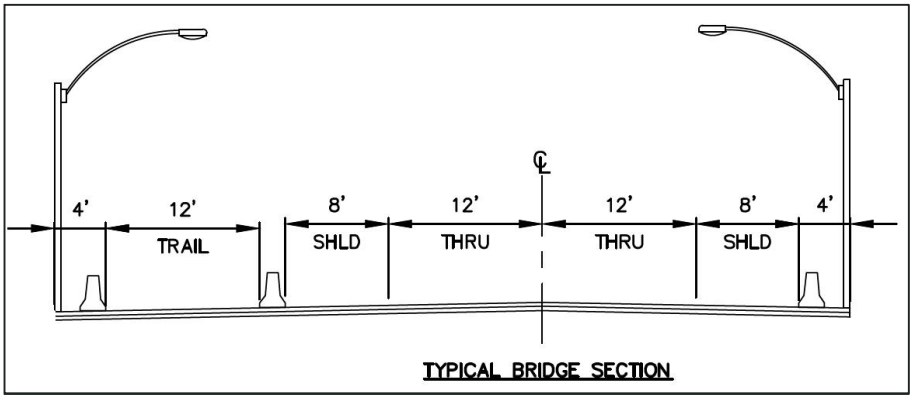


Figure 23: Potential Red River Crossing Alignment at 47th Avenue S

Figure 24: Potential Red River Crossing Alignment at Merrifield Road

Red River Crossing Opinion of Probable Costs

Once concept alignments were developed, quantities were estimated at a planning level for the five proposed Red River crossings locations. These quantities were developed using the concepts shown in **Figures 20-24**. The following typical section, consistent with the typical section assumed as part of the Feasibility Study, was used for all river crossings with the exception of the Merrifield Crossing where the trail section was not assumed given its rural location:



The following are some assumptions that were used to develop the opinion of probable costs:

- Drainage and erosion control - 40% of all items except bridge, dikes, and mobilization
- Non-quantifiable minor items - 20% of all items except for bridge, dikes, drainage, erosion control and mobilization
- Mobilization - 8% of all other construction items
- Contingency – 10% of all construction items
- Engineering design and construction - 25% of construction cost
- Right-of-way costs were not included in this analysis

The prior analysis completed for the 2025 plan develop cost estimates using very high level planning techniques. The following four unit prices that went into those costs: intersection reconstruction type, length of bridge, length of roadway and if there were dike modifications. Additional review was completed as a part of this analysis to expand the list of quantities used to develop the opinion of probable costs.

Since bridge costs have a history of considerable variation and are such a large part of these concept costs, additional detail is provided here to explain how the bridge planning level unit price was developed. A bridge construction cost of $150/SF is typically used for general, high-level planning purposes. However, bridges over the Red River will require significant costs not typically found in a 'normal' bridge (e.g., river cofferdams and significant quantities of large, driven piles), that drastically increase the construction cost. These bridges, in an urban setting, will also likely receive higher than normal amounts of architectural treatments, which will also increase cost. Due to several unknowns, a conservative unit cost well above the $150/SF planning level costs noted above was used.

In recent years, construction costs have increased significantly across the board. For illustration purposes, items and quantities from MnDOT Br 14012 (US-10 over the Red River in Fargo, built 2003), were combined with today's costs to give a 'real world' cost for a modern bridge constructed over the Red River in northern Minnesota, in an urban environment. Br 14012 is a continuous steel girder bridge, the cost of which has fluctuated dramatically over the last few years (e.g., $2.34/lb in 2017, $4.20/lb 2016 and $10.00/lb in 2015); this item's cost has a dramatic effect on the overall cost/square foot ($/SF) of the bridge. The estimate for this bridge could now be nearly $26 million, or around $360/SF, compared to the original cost of about $130/SF. However, these river crossing bridges are candidates for continuous steel beams, to shorten the structural depth to assist in obtaining the clearance over the high-water elevation. This type of structure could be over $300/SF. NDDOT and MnDOT both provided input on recent bridge costs and both DOT's agreed that $250/SF was a reasonable unit price estimate. Due to variability in historic construction costs, bridge unit costs of $250/SF and $300/SF were used to develop a range of opinion of

probable costs for each alternative. Since a 10% contingency is being assumed for the overall cost, addition contingency was not added to the assumed $250 - $300/SF bridge unit prices.

Tables 17-24 show the opinion of probable cost for each of the river crossing alternatives. **Table 25** summarizes the cost from the early 2000 river crossing analysis. **Table 26** summarizes the 2018 planning level opinion of probable costs for each river crossing alternative in one location. These options have not been vetted against geotechnical, hydraulic, or structural capacities, and represent a very high-level opinion of probable cost for each option. Further investigation of these unknowns will be required to more accurately define these costs. The quantities developed represents a level of effort coinciding with a regional long range planning study. To provide opinion of probable cost, items, quantities, and prices used have been determined using existing plans, previous project experience, and engineering judgement.

The bridge cross-section used as part of the prior analysis is still an appropriate cross-section to use as part of a long-range planning study. The goal is usually to be more conservative during planning phases of the project. Although it is still recommended that as part of a river crossing feasibility or environmental study additional review of the bridge cross-section is completed. At that time confirming the cross-section and testing more conservative options is prudent. Based on our review the following are potential areas where the bridge width could be reduced:

- There could be an option to save 4' by reducing the shoulders from 8' to 6' which provides 18' in each direction. This width is still wide enough for most traffic to get around a stalled vehicle if it were parked on the edge although many vehicles would not fit well within the provided 6' shoulder.
- Consider reducing the width of bridge provided from the end of the barrier to the edge of the bridge. There is a potential 2' (1' in each direction) that could be saved by reducing the bridge width between the edge of the barrier and edge of the bridge.
- The pedestrian facility could be reduced from 12' to 10' saving 2' of bridge width.

If the narrower cross-section discussed above is agreed to during a feasibility or environmental study, a reduction in bridge costs of about 12% could be achieved.

17TH AVENUE S RIVER CROSSING

Table 17: 17th Avenue S River Crossing Opinion of Probable Cost (Low)

Description	Quantity	UM	Unit Price	Total
COMMON EXCAVATION	12,500	CY	$ 8.00	$ 100,000
COMMON FILL	22,300	CY	$ 13.00	$ 289,900
WALKS	56,500	SF	$ 15.00	$ 847,500
BITUMINOUS	205,800	SF	$ 2.50	$ 514,500
CURB AND GUTTER	6,800	LF	$ 20.00	$ 136,000
DRAINAGE AND EROSION CONTROL	1	LS	40%	$ 755,160
NON QUANTIFIED MINOR ITEMS			20%	$ 528,612
BRIDGE	74,400	SF	$ 250.00	$ 18,600,000
50-FT DIKE STRUCTURE	2	EA	$ 200,000.00	$ 400,000
MOBILIZATION			8%	$ 1,773,734
CONTINGENCY			10%	$ 2,394,541
ENGINEERING / CONST.			25%	$ 6,584,987
Total				$ 32,924,933

Table 18: 17th Avenue S River Crossing Opinion of Probable Cost (High and Dry)

Description	Quantity	UM	Unit Price	Total
COMMON EXCAVATION	800	CY	$ 8.00	$ 6,400
COMMON FILL	29,300	CY	$ 13.00	$ 380,900
WALKS	56,500	SF	$ 15.00	$ 847,500
BITUMINOUS	205,800	SF	$ 2.50	$ 514,500
CURB AND GUTTER	2,900	LF	$ 20.00	$ 58,000
DRAINAGE AND EROSION CONTROL			40%	$ 722,920
NON QUANTIFIED MINOR ITEMS			20%	$ 506,044
BRIDGE	192,200	SF	$ 250.00	$ 48,050,000
MOBILIZATION			8%	$ 4,086,901
CONTINGENCY			10%	$ 5,517,317
ENGINEERING / CONST.			25%	$ 15,172,620
Total				$ 75,863,102

ELKS DRIVE RIVER CROSSING

Table 19: Elks Drive River Crossing Opinion of Probable Cost (Low)

Description	Quantity	UM	Unit Price	Total
COMMON EXCAVATION	3,800	CY	$ 8.00	$ 30,400
COMMON FILL	31,600	CY	$ 13.00	$ 410,800
WALKS	46,100	SF	$ 15.00	$ 691,500
BITUMINOUS	184,200	SF	$ 2.50	$ 460,500
CURB AND GUTTER	7,800	LF	$ 20.00	$ 156,000
DRAINAGE AND EROSION CONTROL			40%	$ 699,680
NON QUANTIFIED MINOR ITEMS			20%	$ 489,776
BRIDGE	43,400	SF	$ 250.00	$ 10,850,000
50-FT DIKE STRUCTURE	1	EA	$ 200,000.00	$ 200,000
MOBILIZATION			8%	$ 1,119,092
CONTINGENCY			10%	$ 1,510,775
ENGINEERING / CONST.			25%	$ 4,154,631
Total				$ 20,773,154

Table 20: Elks Drive River Crossing Opinion of Probable Cost (High and Dry)

Description	Quantity	UM	Unit Price	Total
COMMON EXCAVATION	500	CY	$ 8.00	$ 4,000
COMMON FILL	42,900	CY	$ 13.00	$ 557,700
WALKS	48,100	SF	$ 15.00	$ 721,500
BITUMINOUS	192,200	SF	$ 2.50	$ 480,500
CURB AND GUTTER	4,600	LF	$ 20.00	$ 92,000
DRAINAGE AND EROSION CONTROL			40%	$ 742,280
NON QUANTIFIED MINOR ITEMS			20%	$ 519,596
BRIDGE	155,000	SF	$ 250.00	$ 38,750,000
MOBILIZATION			8%	$ 3,349,406
CONTINGENCY			10%	$ 4,521,698
ENGINEERING / CONST.			25%	$ 12,434,670
Total				$ 62,173,350

32nd AVENUE S RIVER CROSSING

Table 21: 32nd Avenue S River Crossing Opinion of Probable Cost (Low)

Description	Quantity	UM	Unit Price	Total
COMMON EXCAVATION	13,900	CY	$ 8.00	$ 111,200
COMMON FILL	22,300	CY	$ 13.00	$ 289,900
WALKS	50,900	SF	$ 15.00	$ 763,500
BITUMINOUS	202,500	SF	$ 2.50	$ 506,250
CURB AND GUTTER	8,200	LF	$ 20.00	$ 164,000
DRAINAGE AND EROSION CONTROL			40%	$ 733,940
NON QUANTIFIED MINOR ITEMS			20%	$ 513,758
BRIDGE	62,000	SF	$ 250.00	$ 15,500,000
50-FT DIKE STRUCTURE	2	EA	$ 200,000.00	$ 400,000
MOBILIZATION			8%	$ 1,518,604
CONTINGENCY			10%	$ 2,050,115
ENGINEERING / CONST.			25%	$ 5,637,817
Total				$ 28,189,084

Table 22: 32nd Avenue S River Crossing Opinion of Probable Cost (High and Dry)

Description	Quantity	UM	Unit Price	Total
COMMON EXCAVATION	300	CY	$ 8.00	$ 2,400
COMMON FILL	53,700	CY	$ 13.00	$ 698,100
WALKS	50,900	SF	$ 15.00	$ 763,500
BITUMINOUS	203,000	SF	$ 2.50	$ 507,500
CURB AND GUTTER	5,200	LF	$ 20.00	$ 104,000
DRAINAGE AND EROSION CONTROL			40%	$ 830,200
NON QUANTIFIED MINOR ITEMS			20%	$ 581,140
BRIDGE	155,000	SF	$ 250.00	$ 38,750,000
MOBILIZATION			8%	$ 3,378,947
CONTINGENCY			10%	$ 4,561,579
ENGINEERING / CONST.			25%	$ 12,544,341
Total				$ 62,721,707

47th AVENUE S RIVER CROSSING

Table 23: 47th Avenue S River Crossing Opinion of Probable Cost (Low)

Description	Quantity	UM	Unit Price	Total
COMMON EXCAVATION	2,800	CY	$ 8.00	$ 22,400
COMMON FILL	43,500	CY	$ 13.00	$ 565,500
WALKS	44,600	SF	$ 15.00	$ 669,000
BITUMINOUS	178,300	SF	$ 2.50	$ 445,750
CURB AND GUTTER	7,100	LF	$ 20.00	$ 142,000
DRAINAGE AND EROSION CONTROL			40%	$ 737,860
NON QUANTIFIED MINOR ITEMS			20%	$ 516,502
BRIDGE	55,800	SF	$ 250.00	$ 13,950,000
50-FT DIKE STRUCTURE	1	EA	$ 200,000.00	$ 200,000
MOBILIZATION			8%	$ 1,379,921
CONTINGENCY			10%	$ 1,862,893
ENGINEERING / CONST.			25%	$ 5,122,957
Total				$ 25,614,783

MERRIFIELD ROAD RIVER CROSSING

Table 24: Merrifield Road River Crossing Opinion of Probable Cost (Low)

Description	Quantity	UM	Unit Price	Total
COMMON EXCAVATION	16,500	CY	$ 8.00	$ 132,000
COMMON FILL	141,800	CY	$ 13.00	$ 1,843,400
BITUMINOUS	262,700	SF	$ 2.50	$ 656,750
CURB AND GUTTER	11,600	LF	$ 20.00	$ 232,000
DRAINAGE AND EROSION CONTROL			40%	$ 1,145,660
NON QUANTIFIED MINOR ITEMS			20%	$ 801,962
BRIDGE	40,000	SF	$ 250.00	$ 10,000,000
BOX CULVERT[3]	460	LF	$ 1,650.00	$ 759,000
COLE CREEK DIVERSION[1, 3]			$ 3,900,000.00	$ 3,900,000
TOWNSHIP ROAD BRIDGE[2, 3]			$ 1,300,000.00	$ 1,300,000
50-FT DIKE STRUCTURE	1	EA	$ 200,000.00	$ 200,000
MOBILIZATION			8%	$ 1,677,662
CONTINGENCY			10%	$ 2,264,843
ENGINEERING / CONST.			25%	$ 6,228,319
Total				$ 31,141,596

[1] $2,200,000 from 2004 Feasibility Study Inflated by 4% and Rounded Up

[2] $707,000 from 2004 Feasiblity Study Inflated by 4% and Rounded Up

[3] Diversion, subsequent control structure(s), and culvert have not been vetted for feasibility.

RIVER CROSSING COST SUMMARY AND COMPARISON

Tables 25 and **26** that compare the early 2000 and 2018 river crossing costs show a significant increase in the anticipated costs that have occurred over the last 18 years. This is due in part to rising construction costs and inflation. A range is provided in **Table 26** due to the early stages of the planning process and to account for potential variations in construction costs. The range was developed using two different bridge unit costs, $250/SF and $300/SF, to develop a range of opinion of probable costs for each alternative..

Table 25: River Crossing Alternative Cost Summary (early 2000 costs)

Cost Summary - Early 2000 Analysis		
Crossing Location	Alternative	Cost
17th Avenue S	Low	$ 16,368,000
	High	$ 30,204,000
Elks Drive	Low	$ 10,668,000
32nd Avenue S	Low	$ 19,140,000
	High	$ 24,804,000
47th Avenue S	--	NA
Merrifield Road	Low	$ 19,500,000

Table 26: River Crossing Alternative Cost Summary (2018 costs)

Cost Summary - Year 2018		
Crossing Location	Alternative	Cost
17th Avenue S	Low	$33,000,000-$39,000,000
	High	$76,000,000-$91,000,000
Elks Drive	Low	$21,000,000-$24,000,000
	High	$63,000,000-$74,000,000
32nd Avenue S	Low	$29,000,000-$33,000,000
	High	$63,000,000-$75,000,000
47th Avenue S	Low	$26,000,000-$30,000,000
Merrifield Road	Low	$32,000,000-$35,000,000

The high bridge options all cost considerably more than the low bridge options. Given the lack of funding available and resulting lower B/C ratios, the Grand Forks – East Grand Forks MPO Executive Board voted to eliminate additional work associated with the high river crossing alternatives.

Red River Crossing Benefit Calculations

With opinion of probable cost estimates completed, benefit is the other variable that needs to be determined to calculate the benefit cost ratio. The cost difference for the following benefit categories: travel time, operations, crash costs, and air quality was calculated for each river crossing. The key assumptions used in these calculations were:

1. Year of Opening 2030; analysis consists of a 20-year benefit period consisting of 260 weekdays per year, consistent with best practices and USDOT guidance. Note, however, that some benefits would also accrue during weekend days; therefore, the results provided below may underestimate benefits (and associated benefit cost ratios).
2. Base year (2015) and forecasted (2045) VMT and VHT were from Grand Forks-East Grand Forks MPO Travel Demand Model. Base year VMT/VHT was adjusted to reflect the same proportional difference between No Build/Build scenarios as used in the previous analysis. Because 47th Avenue S was not previously analyzed, the proportion from the 32nd Avenue S Alternative was used for that alternative.
3. Values for discount rate (7%), vehicle occupancy rates, crash costs, and emissions costs were based on USDOT's *Benefit-Cost Analysis Guidance for Discretionary Grant Programs, June 2018. T*he auto vehicle operating cost/mile used was the IRS mileage rate of $0.545/mile. The auto travel time cost/hour used was the Bureau of Labor Statistics North Dakota mean hourly wage of $23.14.
4. Average crash rates were derived from MnDOT Segment Crash Toolkit and Grand Forks MPO functional classification system design criteria.
5. There were two different fleet compositions assumed: 1) fleet composition based on an estimate of 5% trucks (except for the Merrifield Road Alternative, where 10% was assumed) and 2) fleet composition with 0% trucks (assumes trucks are prohibited on the new crossings).

Tables 27-36 include the total benefits and travel time, operations, crash cost and air quality sub component benefits for each river crossing concept and fleet composition combination. There is only a slight difference between the with and without truck alternatives with the with truck alternatives having a higher benefit.

These benefit values were then divided by costs to develop a benefit cost ratio for each scenario. Construction costs were discounted to assume construction occurring in 2028-2029 and residual value (remaining capital value) was calculated to account for the fact that the service life of some infrastructure (e.g. bridges) would last beyond the assumed 20-year benefit period.

Table 27: 17th Avenue S River Crossing Benefits (with 5% trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	$22,799,000
Operations	$6,434,000
Crash Costs	$898,000
Air Quality	$91,000
Total Benefits	$30,222,000

Table 28: 17th Avenue S River Crossing Benefits (without trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	$22,926,000
Operations	$6,232,000
Crash Costs	$898,000
Air Quality	$90,000
Total Benefits	$30,146,000

Table 29: Elks Drive River Crossing Benefits (with 5% trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	$17,426,000
Operations	$8,410,000
Crash Costs	$1,685,000
Air Quality	$119,000
Total Benefits	$27,640,000

Table 30: Elks Drive River Crossing Benefits (without trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	$17,523,000
Operations	$8,144,000
Crash Costs	$1,685,000
Air Quality	$118,000
Total Benefits	$27,470,000

Table 31: 32nd Avenue S River Crossing Benefits (with 5% trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	$26,449,000
Operations	$14,787,000
Crash Costs	$2,885,000
Air Quality	$210,000
Total Benefits	$44,331,000

Table 32: 32nd Avenue S River Crossing Benefits (without trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	$26,596,000
Operations	$14,320,000
Crash Costs	$2,885,000
Air Quality	$207,000
Total Benefits	$44,008,000

Table 33: 47th Avenue S River Crossing Benefits (with 5% trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	-$5,537,000
Operations	$8,011,000
Crash Costs	$1,520,000
Air Quality	$114,000
Total Benefits	$4,108,000

Table 34: 47th Avenue S River Crossing Benefits (without trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	-$5,568,000
Operations	$7,758,000
Crash Costs	$1,520,000
Air Quality	$112,000
Total Benefits	$3,822,000

Table 35: Merrifield Road River Crossing Benefits (with 10% trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	$21,752,000
Operations	$9,613,000
Crash Costs	$1,920,000
Air Quality	$128,000
Total Benefits	$33,413,000

Table 36: Merrifield Road River Crossing Benefits (without trucks)

Benefit Category	Benefits Compared to No Build Alternative ($2017)
Travel Time	$22,372,000
Operations	$8,267,000
Crash Costs	$1,920,000
Air Quality	$120,000
Total Benefits	$32,679,000

Red River Crossing Evaluation Summaries

Using the information discussed previously, tables have been created for each river crossing documenting VHT, VMT, Construction Costs and B/C ratio. **Tables 37-41** summarize this information for each river crossing alternative. The tables included below are the fleet scenario that does not include trucks.

Table 37: 17th Avenue S River Crossing Evaluation Summary (Low) (without trucks)

Issue	Method of Measurement	Units	Value	Change from Base Conditions
Traffic Operations Factors				
Traffic Flow and Congestion	VHT statistics from the travel demand model	Daily vehicle hours traveled	59,056	(646)
Reduced Trip Length	VMT statistics from the travel demand model	Daily vehicle miiles traveled	1,044,926	(9,858)
Project Costs				
Construction Costs	Estimated cost of construction in 2018 dollars	Dollars	$33,000,000-$39,000,000	N/A
Socio Economic Factors				
Roadway User Economic Analysis	Use VMT and VHT statistices to determine benefits compared to construction costs	B/C ratio	1.9 - 2.1	N/A

Table 38: Elks Drive River Crossing Evaluation Summary (Low) (without trucks)

Issue	Method of Measurement	Units	Value	Change from Base Conditions
Traffic Operations Factors				
Traffic Flow and Congestion	VHT statistics from the travel demand model	Daily vehicle hours traveled	59,180	(522)
Reduced Trip Length	VMT statistics from the travel demand model	Daily vehicle miiles traveled	1,040,184	(14,600)
Project Costs				
Construction Costs	Estimated cost of construction in 2018 dollars	Dollars	$21,000,000-$24,000,000	N/A
Socio Economic Factors				
Roadway User Economic Analysis	Use VMT and VHT statistices to determine benefits compared to construction costs	B/C ratio	2.6 - 3.0	N/A

Table 39: 32nd Avenue S River Crossing Evaluation Summary (Low) (without trucks)

Issue	Method of Measurement	Units	Value	Change from Base Conditions
Traffic Operations Factors				
Traffic Flow and Congestion	VHT statistics from the travel demand model	Daily vehicle hours traveled	58,871	(831)
Reduced Trip Length	VMT statistics from the travel demand model	Daily vehicle miiles traveled	1,030,063	(24,721)
Project Costs				
Construction Costs	Estimated cost of construction in 2018 dollars	Dollars	$29,000,000-$33,000,000	N/A
Socio Economic Factors				
Roadway User Economic Analysis	Use VMT and VHT statistices to determine benefits compared to construction costs	B/C ratio	3.1 - 3.5	

Table 40: 47th Avenue S River Crossing Evaluation Summary (Low) (without trucks)

Issue	Method of Measurement	Units	Value	Change from Base Conditions
Traffic Operations Factors				
Traffic Flow and Congestion	VHT statistics from the travel demand model	Daily vehicle hours traveled	59,876	174
Reduced Trip Length	VMT statistics from the travel demand model	Daily vehicle miiles traveled	1,041,391	(13,393)
Project Costs				
Construction Costs	Estimated cost of construction in 2018 dollars	Dollars	$26,000,000-$30,000,000	N/A
Socio Economic Factors				
Roadway User Economic Analysis	Use VMT and VHT statistices to determine benefits compared to construction costs	B/C ratio	0.4 - 0.5	

The 47th Avenue S river crossing would also require the reconstruction of approximately 1.9 miles of Rhinehart Drive/445th Avenue SW between the intersections of 13th Street SE and Rhinehart Drive/445th Avenue SW and Rhinehart Drive/445th Avenue SW and 200th Street SW and 1.5 miles of 200th Street between Rhinehart Drive/445th Avenue SW and CSAH 58. Those reconstruction costs are not included in Table 40.

Table 41: Merrifield Road River Crossing Evaluation Summary (Low) (without trucks)

Issue	Method of Measurement	Units	Value	Change from Base Conditions
Traffic Operations Factors				
Traffic Flow and Congestion	VHT statistics from the travel demand model	Daily vehicle hours traveled	59,023	(679)
Reduced Trip Length	VMT statistics from the travel demand model	Daily vehicle miiles traveled	1,037,067	(17,717)
Project Costs				
Construction Costs	Estimated cost of construction in 2018 dollars	Dollars	$32,000,000-$35,000,000	N/A
Socio Economic Factors				
Roadway User Economic Analysis	Use VMT and VHT statistices to determine benefits compared to construction costs	B/C ratio	2.2 - 2.4	

We also reviewed the B/C ratios based on the with truck fleet scenario (assumed 5% trucks at all crossing except Merrifield where 10% trucks were assumed). The benefic cost ratios were the same under all scenarios above except the following:

- 32nd Avenue S has a high-end B/C ratio of 3.6 with trucks as compared to 3.5 without trucks
- Elks Drive has a low-end B/C ratio of 2.7 with trucks as compared to 2.6 without trucks.

Table 42 summarizes the B/C ratios for each river crossing alternative in one location.

Table 42: River Crossing Alternative B/C Summary

B/C Summary		
Crossing Location	Alternative	Cost
17th Avenue S	Low	**1.9 - 2.1**
Elks Drive	Low	**2.6 - 3.0**
32nd Avenue S	Low	**3.1 - 3.5**
47th Avenue S	Low	0.4 - 0.5
Merrifield Road	Low	**2.2 - 2.4**

Based on B/C information above, all the low river crossing options have B/C ratios above 1.0 except for the 47th Avenue S river crossing. The 32nd Avenue S river crossing has the highest B/C ratio of the three river crossings that will serve mostly local traffic. The Merrifield Road river crossing has the highest B/C ratio of the two river crossings that will serve mostly regional trips.

Appendices

Appendix A: Synchro Output

Appendix B: River Crossing Concept Drawings

Appendix A: Synchro Output

Level of Service and Delay by Scenario															
		Existing PM Peak		2045 No Build PM Peak		2045 Build 17th Avenue PM Peak		2045 Build Elks Drive Crossing		2045 Build 32nd Avenue Crossing		2045 Build 47th Avenue Crossing		2045 Build Merrifield Crossing	
Intesection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Demers Avenue at 5th Street	EB	11	B	17	B	14	B	15	B	15	B	16	B	16	B
	WB	13	B	19	B	16	B	17	B	18	B	18	B	19	B
	NB	19	B	23	C	22	C	20	B	20	C	20	C	21	C
	SB	17	B	20	B	20	B	18	B	18	B	18	B	18	B
	Intesection	14	B	19	B	17	B	17	B	17	B	18	B	18	B
Demers Avenue at S Washington	EB	51	D	71	E	53	D	54	D	53	D	50	D	59	E
	WB	54	D	89	F	63	E	63	E	72	E	70	E	88	F
	NB	29	C	70	E	36	D	32	C	61	E	64	E	66	E
	SB	50	D	82	F	52	D	58	E	74	E	90	F	83	F
	Intesection	47	D	80	E	53	D	53	D	67	E	70	E	77	E
S Washington at 17th Avenue	EB	45	D	66	E	67	E	45	D	69	E	64	E	69	E
	WB	33	C	44	D	55	D	37	D	46	D	43	D	44	D
	NB	25	C	32	C	27	C	30	C	29	C	29	C	30	C
	SB	27	C	49	D	30	C	28	C	35	C	37	D	42	D
	Intesection	30	C	45	D	39	D	32	C	40	D	40	D	43	D
S Washington at 32nd Avenue	EB	61	E	94	F	78	E	90	F	104	F	87	F	91	F
	WB	62	E	83	F	107	F	107	F	128	F	98	F	98	F
	NB	33	C	65	E	21	C	24	C	39	D	28	C	26	C
	SB	54	D	78	E	68	E	63	E	103	F	91	F	82	F
	Intesection	50	D	77	E	56	E	58	E	83	F	66	E	64	E
1st Street at 3rd Avenue	EB	14	B	22	C	17	B	14	B	17	B	14	B	17	B
	WB	13	B	18	B	14	B	13	B	14	B	12	B	14	B
	NB	4	A	8	A	4	A	4	A	4	A	5	A	7	A
	SB	5	A	7	A	5	A	5	A	5	A	6	A	7	A
	Intesection	6	A	11	B	6	A	6	A	7	A	7	A	9	A
24th Avenue at Washington Street	EB	56	E	107	F	99	F	99	F	95	F	107	F	99	F
	WB	44	D	52	D	54	D	54	D	47	D	48	D	48	D
	NB	5	A	12	B	8	A	15	B	10	A	5	A	6	A
	SB	49	D	44	D	39	D	43	D	48	D	61	E	54	D
	Intesection	35	C	38	D	34	C	38	D	37	D	43	D	39	D
47th Avenue at Washington Street	EB	24	C	132	F	109	F	113	F	128	F	144	F	130	F
	WB	21	C	47	D	44	D	51	D	45	D	63	E	41	D
	NB	15	B	78	E	71	E	82	F	80	E	96	F	73	E
	SB	17	B	48	D	45	D	50	D	51	D	57	E	51	D
	Intesection	18	B	74	E	67	E	74	E	76	E	87	F	74	E
4th Avenue at Belmont Road	Worst Approach	16	C	95	F	16	C	16	C	21	C	28	D	71	F
	Intesection	15	B	69	F	15	C	14	B	19	C	23	C	54	F
17th Avenue at Belmont Road	Worst Approach	15	C	26	D	>150	F	18	C	20	C	20	C	24	C
	Intesection	2	A	3	A	>150	F	2	A	3	A	2	A	3	A
Greenway Blvd/Bygland Rd/13th	Worst Approach	13	B	66	F	>150	F	>150	F	27	D	35	E	63	F
	Intesection	5	A	21	C	142	F	51	F	12	B	14	B	20	C
Greenway Blvd at Rhinehart Dr	Worst Approach	9	A	9	A	11	B	11	B	10	B	10	A	9	A
	Intesection	5	A	6	A	5	A	5	A	4	A	4	A	6	A
24th Avenue at Belmont Road	Worst Approach	16	C	27	D	105	F	>150	F	21	C	19	C	24	C
	Intesection	3	A	3	A	18	C	92	F	3	A	2	A	2	A
Elks Drive at Belmont Road	Worst Approach	13	B	22	C	44	E	>150	F	15	B	14	B	19	C
	Intesection	12	B	21	C	39	E	>150	F	14	B	13	B	18	C
32nd Avenue at Belmont Road	Worst Approach	13	B	91	F	85	F	>150	F	>150	F	33	D	76	F
	Intesection	12	B	55	F	52	F	112	F	>150	F	25	C	47	E
47th Avenue at Belmont Road	Worst Approach	13	B	21	C	19	C	18	C	21	C	>150	F	17	C
	Intesection	5	A	7	A	6	A	6	A	7	A	>150	F	6	A

HCM 2010 Signalized Intersection Summary
9: Washington St & 32nd Ave

09/21/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	354	266	215	40	230	72	190	531	36	81	733	420
Future Volume (veh/h)	354	266	215	40	230	72	190	531	36	81	733	420
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1850	1832	1779	1832	1814	1814	1814	1779	1814	1832	1832
Adj Flow Rate, veh/h	454	306	0	89	271	0	250	672	0	116	833	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	1	1	2	1
Peak Hour Factor	0.78	0.87	0.96	0.45	0.85	0.75	0.76	0.79	0.75	0.70	0.88	0.97
Percent Heavy Veh, %	1	0	1	4	1	2	2	2	4	2	1	1
Cap, veh/h	519	494	416	111	328	276	505	1386	608	142	1131	506
Arrive On Green	0.05	0.09	0.00	0.07	0.18	0.00	0.15	0.40	0.00	0.03	0.11	0.00
Sat Flow, veh/h	3384	1850	1557	1694	1832	1542	3351	3446	1512	1727	3480	1557
Grp Volume(v), veh/h	454	306	0	89	271	0	250	672	0	116	833	0
Grp Sat Flow(s),veh/h/ln	1692	1850	1557	1694	1832	1542	1676	1723	1512	1727	1740	1557
Q Serve(g_s), s	16.0	19.1	0.0	6.2	17.1	0.0	8.2	17.4	0.0	8.0	27.8	0.0
Cycle Q Clear(g_c), s	16.0	19.1	0.0	6.2	17.1	0.0	8.2	17.4	0.0	8.0	27.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	519	494	416	111	328	276	505	1386	608	142	1131	506
V/C Ratio(X)	0.87	0.62	0.00	0.81	0.83	0.00	0.49	0.48	0.00	0.82	0.74	0.00
Avail Cap(c_a), veh/h	592	516	435	184	389	328	505	1386	608	216	1131	506
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.90	0.90	0.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	55.8	48.8	0.0	55.3	47.5	0.0	46.8	26.6	0.0	57.5	48.6	0.0
Incr Delay (d2), s/veh	11.4	3.3	0.0	5.1	14.8	0.0	0.3	1.1	0.0	6.6	3.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	10.3	0.0	3.1	10.0	0.0	3.8	8.4	0.0	4.1	14.0	0.0
LnGrp Delay(d),s/veh	67.2	52.1	0.0	60.4	62.3	0.0	47.0	27.7	0.0	64.1	52.2	0.0
LnGrp LOS	E	D		E	E		D	C		E	D	
Approach Vol, veh/h		760			360			922			949	
Approach Delay, s/veh		61.1			61.8			33.0			53.7	
Approach LOS		E			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.6	45.0	12.8	38.6	14.8	53.8	23.4	28.0
Change Period (Y+Rc), s	5.5	* 6	5.0	6.5	5.0	5.5	5.0	6.5
Max Green Setting (Gmax), s	12.0	* 39	13.0	33.5	15.0	36.5	21.0	25.5
Max Q Clear Time (g_c+I1), s	10.2	29.8	8.2	21.1	10.0	19.4	18.0	19.1
Green Ext Time (p_c), s	0.3	5.8	0.0	3.7	0.0	8.0	0.4	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	50.2
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	529	55	75	603	37	119	151	47	49	211	58
Future Volume (veh/h)	67	529	55	75	603	37	119	151	47	49	211	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814
Adj Flow Rate, veh/h	73	575	60	82	655	40	129	164	51	53	229	63
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	336	973	827	384	973	827	346	544	462	399	544	462
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	747	1814	1542	789	1814	1542	1083	1814	1542	1162	1814	1542
Grp Volume(v), veh/h	73	575	60	82	655	40	129	164	51	53	229	63
Grp Sat Flow(s),veh/h/ln	747	1814	1542	789	1814	1542	1083	1814	1542	1162	1814	1542
Q Serve(g_s), s	4.3	11.8	1.0	4.3	14.4	0.7	6.0	3.8	1.3	2.0	5.6	1.6
Cycle Q Clear(g_c), s	18.7	11.8	1.0	16.2	14.4	0.7	11.5	3.8	1.3	5.9	5.6	1.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	336	973	827	384	973	827	346	544	463	399	544	463
V/C Ratio(X)	0.22	0.59	0.07	0.21	0.67	0.05	0.37	0.30	0.11	0.13	0.42	0.14
Avail Cap(c_a), veh/h	336	973	827	384	973	827	346	544	463	399	544	463
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.1	8.7	6.2	14.1	9.3	6.1	20.0	14.8	13.9	17.1	15.4	14.0
Incr Delay (d2), s/veh	1.5	2.6	0.2	1.3	3.7	0.1	3.1	1.4	0.5	0.7	2.4	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	6.5	0.5	1.1	8.1	0.3	2.0	2.1	0.6	0.7	3.1	0.8
LnGrp Delay(d),s/veh	17.5	11.3	6.3	15.4	13.0	6.2	23.1	16.2	14.4	17.8	17.8	14.7
LnGrp LOS	B	B	A	B	B	A	C	B	B	B	B	B
Approach Vol, veh/h		708			777			344			345	
Approach Delay, s/veh		11.5			12.9			18.5			17.2	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		21.0		34.0		21.0		34.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		16.5		29.5		16.5		29.5
Max Q Clear Time (g_c+I1), s		13.5		20.7		7.9		18.2
Green Ext Time (p_c), s		1.1		5.8		2.3		7.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.0
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	184	210	182	128	170	131	70	961	103	100	1118	173
Future Volume (veh/h)	184	210	182	128	170	131	70	961	103	100	1118	173
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1832	1850	1850	1832	1832	1832	1832	1850	1850	1832	1850
Adj Flow Rate, veh/h	211	273	212	151	187	142	84	1022	149	147	1202	204
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.77	0.86	0.85	0.91	0.92	0.83	0.94	0.69	0.68	0.93	0.85
Percent Heavy Veh, %	2	1	0	0	1	1	1	1	0	0	1	0
Cap, veh/h	283	286	393	230	286	403	164	1317	712	181	1283	698
Arrive On Green	0.08	0.16	0.16	0.08	0.16	0.16	0.09	0.38	0.38	0.10	0.37	0.37
Sat Flow, veh/h	1727	1832	1569	1762	1832	1557	1744	3480	1570	1762	3480	1572
Grp Volume(v), veh/h	211	273	212	151	187	142	84	1022	149	147	1202	204
Grp Sat Flow(s),veh/h/ln	1727	1832	1569	1762	1832	1557	1744	1740	1570	1762	1740	1572
Q Serve(g_s), s	6.0	11.8	1.7	5.8	7.7	5.9	3.7	20.7	4.6	6.5	26.6	2.8
Cycle Q Clear(g_c), s	6.0	11.8	1.7	5.8	7.7	5.9	3.7	20.7	4.6	6.5	26.6	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	283	286	393	230	286	403	164	1317	712	181	1283	698
V/C Ratio(X)	0.75	0.95	0.54	0.66	0.65	0.35	0.51	0.78	0.21	0.81	0.94	0.29
Avail Cap(c_a), veh/h	283	286	393	230	286	403	196	1317	712	198	1283	698
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89	0.26	0.26	0.26
Uniform Delay (d), s/veh	29.8	33.5	10.2	26.8	31.7	24.2	34.5	21.9	13.2	35.1	24.3	4.0
Incr Delay (d2), s/veh	9.2	41.1	2.2	7.0	6.4	0.9	0.8	4.1	0.6	5.6	4.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	9.3	2.6	3.2	4.4	2.6	1.8	10.7	2.1	3.5	13.5	1.2
LnGrp Delay(d),s/veh	39.0	74.6	12.5	33.9	38.1	25.1	35.3	25.9	13.8	40.7	29.1	4.3
LnGrp LOS	D	E	B	C	D	C	D	C	B	D	C	A
Approach Vol, veh/h		696			480			1255			1553	
Approach Delay, s/veh		44.9			32.9			25.1			26.9	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	36.0	11.0	19.0	13.2	36.8	11.0	19.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 30	6.0	12.5	9.0	29.5	6.0	12.5
Max Q Clear Time (g_c+I1), s	5.7	28.6	7.8	13.8	8.5	22.7	8.0	9.7
Green Ext Time (p_c), s	2.4	0.8	0.0	0.0	0.0	5.3	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	30.2
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	171	12	74	116	54	62	952	69	113	1100	200
Future Volume (veh/h)	159	171	12	74	116	54	62	952	69	113	1100	200
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1850	1850	1850	1850	1850	1850	1850	1850	1832	1850	1850
Adj Flow Rate, veh/h	206	216	18	88	123	72	83	1070	88	177	1358	282
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.77	0.79	0.65	0.84	0.94	0.75	0.75	0.89	0.78	0.64	0.81	0.71
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	1	0	0
Cap, veh/h	271	277	462	202	257	404	254	1705	851	205	1567	806
Arrive On Green	0.07	0.15	0.15	0.06	0.14	0.14	0.29	0.97	0.97	0.04	0.15	0.15
Sat Flow, veh/h	1762	1850	1572	1762	1850	1572	1762	3515	1572	1744	3515	1572
Grp Volume(v), veh/h	206	216	18	88	123	72	83	1070	88	177	1358	282
Grp Sat Flow(s),veh/h/ln	1762	1850	1572	1762	1850	1572	1762	1758	1572	1744	1758	1572
Q Serve(g_s), s	8.0	13.5	0.1	5.1	7.4	4.3	4.4	2.8	0.2	12.1	45.3	7.6
Cycle Q Clear(g_c), s	8.0	13.5	0.1	5.1	7.4	4.3	4.4	2.8	0.2	12.1	45.3	7.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	271	277	462	202	257	404	254	1705	851	205	1567	806
V/C Ratio(X)	0.76	0.78	0.04	0.44	0.48	0.18	0.33	0.63	0.10	0.86	0.87	0.35
Avail Cap(c_a), veh/h	271	393	561	221	393	519	254	1705	851	247	1567	806
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	0.85	0.85	0.85
Uniform Delay (d), s/veh	46.1	49.1	15.8	41.6	47.6	34.7	38.1	1.0	0.7	56.7	47.7	10.6
Incr Delay (d2), s/veh	10.6	9.1	0.1	1.8	2.4	0.4	0.2	1.6	0.2	17.5	5.8	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	7.6	0.3	2.6	3.9	1.9	2.2	1.2	0.1	6.9	23.3	3.5
LnGrp Delay(d),s/veh	56.7	58.2	15.8	43.4	50.0	35.1	38.4	2.6	1.0	74.2	53.5	11.6
LnGrp LOS	E	E	B	D	D	D	D	A	A	E	D	B
Approach Vol, veh/h		440			283			1241			1817	
Approach Delay, s/veh		55.8			44.1			4.9			49.0	
Approach LOS		E			D			A			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.8	60.0	11.7	24.5	19.1	64.7	13.0	23.2
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	10.0	* 54	8.0	25.5	17.0	46.5	8.0	25.5
Max Q Clear Time (g_c+I1), s	10.4	47.3	7.1	15.5	14.1	4.8	10.0	9.4
Green Ext Time (p_c), s	0.2	5.5	0.0	2.5	0.0	19.0	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	34.9
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	137	62	31	44	90	20	269	16	133	336	27
Future Volume (veh/h)	27	137	62	31	44	90	20	269	16	133	336	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	29	149	67	34	48	98	22	292	17	145	365	29
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	46	259	220	53	266	226	37	1139	66	183	1478	661
Arrive On Green	0.03	0.14	0.14	0.03	0.15	0.15	0.02	0.34	0.34	0.11	0.43	0.43
Sat Flow, veh/h	1727	1814	1542	1727	1814	1542	1727	3311	192	1727	3446	1542
Grp Volume(v), veh/h	29	149	67	34	48	98	22	151	158	145	365	29
Grp Sat Flow(s),veh/h/ln	1727	1814	1542	1727	1814	1542	1727	1723	1780	1727	1723	1542
Q Serve(g_s), s	0.8	3.6	1.8	0.9	1.1	2.7	0.6	2.9	3.0	3.8	3.1	0.5
Cycle Q Clear(g_c), s	0.8	3.6	1.8	0.9	1.1	2.7	0.6	2.9	3.0	3.8	3.1	0.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	46	259	220	53	266	226	37	593	612	183	1478	661
V/C Ratio(X)	0.62	0.58	0.30	0.64	0.18	0.43	0.60	0.26	0.26	0.79	0.25	0.04
Avail Cap(c_a), veh/h	149	624	530	149	624	530	149	593	612	241	1478	661
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.4	18.6	17.9	22.3	17.4	18.1	22.6	11.0	11.0	20.3	8.5	7.7
Incr Delay (d2), s/veh	13.0	2.0	0.8	12.4	0.3	1.3	14.6	1.0	1.0	12.3	0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.9	0.8	0.6	0.6	1.2	0.4	1.6	1.6	2.4	1.6	0.2
LnGrp Delay(d),s/veh	35.3	20.6	18.6	34.6	17.7	19.4	37.2	12.0	12.0	32.5	8.9	7.9
LnGrp LOS	D	C	B	C	B	B	D	B	B	C	A	A
Approach Vol, veh/h		245			180			331			539	
Approach Delay, s/veh		21.8			21.8			13.7			15.2	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.4	20.0	5.9	11.1	5.5	23.9	5.7	11.3
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.0	4.5	4.5
Max Green Setting (Gmax), s	6.5	16.0	4.0	16.0	4.0	18.5	4.0	16.0
Max Q Clear Time (g_c+I1), s	5.8	5.0	2.9	5.6	2.6	5.1	2.8	4.7
Green Ext Time (p_c), s	0.0	3.2	0.0	1.1	0.0	3.5	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	17.0
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	14.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	33	229	37	109	136	4	19	136	80	4	210	33
Future Vol, veh/h	33	229	37	109	136	4	19	136	80	4	210	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	36	249	40	118	148	4	21	148	87	4	228	36
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	16.2	12.4	14.2	14.9
HCM LOS	C	B	B	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	100%	0%	100%	0%	2%
Vol Thru, %	58%	0%	86%	0%	97%	85%
Vol Right, %	34%	0%	14%	0%	3%	13%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	235	33	266	109	140	247
LT Vol	19	33	0	109	0	4
Through Vol	136	0	229	0	136	210
RT Vol	80	0	37	0	4	33
Lane Flow Rate	255	36	289	118	152	268
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.443	0.073	0.536	0.243	0.29	0.471
Departure Headway (Hd)	6.243	7.279	6.668	7.395	6.862	6.313
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	577	492	541	486	523	569
Service Time	4.29	5.025	4.413	5.145	4.612	4.359
HCM Lane V/C Ratio	0.442	0.073	0.534	0.243	0.291	0.471
HCM Control Delay	14.2	10.6	16.9	12.5	12.4	14.9
HCM Lane LOS	B	B	C	B	B	B
HCM 95th-tile Q	2.3	0.2	3.1	0.9	1.2	2.5

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	58	35	24	229	346	73
Future Vol, veh/h	58	35	24	229	346	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	63	38	26	249	376	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	717	416	455	0	-	0
Stage 1	416	-	-	-	-	-
Stage 2	301	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	396	637	1106	-	-	-
Stage 1	666	-	-	-	-	-
Stage 2	751	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	385	637	1106	-	-	-
Mov Cap-2 Maneuver	385	-	-	-	-	-
Stage 1	666	-	-	-	-	-
Stage 2	731	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.2	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1106	-	452	-	-
HCM Lane V/C Ratio	0.024	-	0.224	-	-
HCM Control Delay (s)	8.3	0	15.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.8	-	-

Intersection	
Intersection Delay, s/veh	11.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	134	31	42	7	15	2	48	156	6	7	214	139
Future Vol, veh/h	134	31	42	7	15	2	48	156	6	7	214	139
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	146	34	46	8	16	2	52	170	7	8	233	151
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.4	9.2	10.8	12.9
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	23%	65%	29%	2%
Vol Thru, %	74%	15%	62%	59%
Vol Right, %	3%	20%	8%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	210	207	24	360
LT Vol	48	134	7	7
Through Vol	156	31	15	214
RT Vol	6	42	2	139
Lane Flow Rate	228	225	26	391
Geometry Grp	1	1	1	1
Degree of Util (X)	0.331	0.345	0.043	0.521
Departure Headway (Hd)	5.214	5.518	5.92	4.791
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	689	652	604	759
Service Time	3.243	3.552	3.967	2.791
HCM Lane V/C Ratio	0.331	0.345	0.043	0.515
HCM Control Delay	10.8	11.4	9.2	12.9
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	1.4	1.5	0.1	3.1

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	61	23	134	4	6	3	51	97	5	7	117	77
Future Vol, veh/h	61	23	134	4	6	3	51	97	5	7	117	77
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	66	25	146	4	7	3	55	105	5	8	127	84

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	408	406	169	489	445	108	211	0	0	111	0	0
Stage 1	184	184	-	219	219	-	-	-	-	-	-	-
Stage 2	224	222	-	270	226	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	554	534	875	489	508	946	1360	-	-	1479	-	-
Stage 1	818	747	-	783	722	-	-	-	-	-	-	-
Stage 2	779	720	-	736	717	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	526	508	875	378	483	946	1360	-	-	1479	-	-
Mov Cap-2 Maneuver	526	508	-	378	483	-	-	-	-	-	-	-
Stage 1	783	743	-	749	691	-	-	-	-	-	-	-
Stage 2	736	689	-	589	713	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.4	12.5	2.6	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1360	-	-	526	791	497	1479	-	-
HCM Lane V/C Ratio	0.041	-	-	0.126	0.216	0.028	0.005	-	-
HCM Control Delay (s)	7.8	0	-	12.8	10.8	12.5	7.4	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.8	0.1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	544	293	510	609	104	120	751	396	106	1047	211
Future Volume (veh/h)	210	544	293	510	609	104	120	751	396	106	1047	211
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1832	1850	1832	1832	1832	1832	1814	1814	1832	1832	1832
Adj Flow Rate, veh/h	223	625	0	586	812	0	152	816	0	123	1151	0
Adj No. of Lanes	2	2	1	2	2	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.87	0.69	0.87	0.75	0.44	0.79	0.92	0.87	0.86	0.91	0.81
Percent Heavy Veh, %	1	1	0	1	1	1	1	2	2	1	1	1
Cap, veh/h	334	638	288	602	894	400	198	1155	517	280	1160	519
Arrive On Green	0.10	0.18	0.00	0.18	0.26	0.00	0.07	0.34	0.00	0.06	0.33	0.00
Sat Flow, veh/h	3384	3480	1572	3384	3480	1557	1744	3446	1542	1744	3480	1557
Grp Volume(v), veh/h	223	625	0	586	812	0	152	816	0	123	1151	0
Grp Sat Flow(s),veh/h/ln	1692	1740	1572	1692	1740	1557	1744	1723	1542	1744	1740	1557
Q Serve(g_s), s	5.7	16.1	0.0	15.5	20.4	0.0	5.2	18.6	0.0	4.1	29.6	0.0
Cycle Q Clear(g_c), s	5.7	16.1	0.0	15.5	20.4	0.0	5.2	18.6	0.0	4.1	29.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	334	638	288	602	894	400	198	1155	517	280	1160	519
V/C Ratio(X)	0.67	0.98	0.00	0.97	0.91	0.00	0.77	0.71	0.00	0.44	0.99	0.00
Avail Cap(c_a), veh/h	338	638	288	602	909	407	198	1155	517	283	1160	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.39	0.39	0.00	1.00	1.00	0.00	0.59	0.59	0.00	0.85	0.85	0.00
Uniform Delay (d), s/veh	39.1	36.6	0.0	36.8	32.4	0.0	22.7	26.1	0.0	19.8	29.9	0.0
Incr Delay (d2), s/veh	1.5	17.6	0.0	30.0	13.1	0.0	9.3	2.2	0.0	0.3	22.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	9.3	0.0	9.7	11.3	0.0	3.0	9.2	0.0	2.0	17.9	0.0
LnGrp Delay(d),s/veh	40.7	54.2	0.0	66.8	45.6	0.0	32.0	28.2	0.0	20.2	52.4	0.0
LnGrp LOS	D	D		E	D		C	C		C	D	
Approach Vol, veh/h		848			1398			968			1274	
Approach Delay, s/veh		50.6			54.4			28.8			49.3	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	36.0	14.4	28.6	10.8	36.2	21.0	22.0
Change Period (Y+Rc), s	5.0	6.0	5.5	* 5.5	5.0	6.0	5.0	5.5
Max Green Setting (Gmax), s	6.0	30.0	9.0	* 24	6.0	30.0	16.0	16.5
Max Q Clear Time (g_c+I1), s	7.2	31.6	7.7	22.4	6.1	20.6	17.5	18.1
Green Ext Time (p_c), s	0.0	0.0	0.7	0.8	0.0	8.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	46.7
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	10	393	0	3	5	112	181	1	8	403	154
Future Volume (veh/h)	118	10	393	0	3	5	112	181	1	8	403	154
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1814	1814	1850	1814	1850	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	128	11	0	0	3	5	122	197	1	9	438	0
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	376	14	199	0	79	132	662	1074	5	864	1081	918
Arrive On Green	0.13	0.13	0.00	0.00	0.13	0.13	0.60	0.60	0.60	0.60	0.60	0.00
Sat Flow, veh/h	1271	109	1542	0	613	1021	947	1803	9	1180	1814	1542
Grp Volume(v), veh/h	139	0	0	0	0	8	122	0	198	9	438	0
Grp Sat Flow(s),veh/h/ln	1380	0	1542	0	0	1634	947	0	1812	1180	1814	1542
Q Serve(g_s), s	3.1	0.0	0.0	0.0	0.0	0.1	2.6	0.0	1.6	0.1	4.2	0.0
Cycle Q Clear(g_c), s	3.2	0.0	0.0	0.0	0.0	0.1	6.8	0.0	1.6	1.7	4.2	0.0
Prop In Lane	0.92		1.00	0.00		0.62	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	390	0	199	0	0	211	662	0	1080	864	1081	918
V/C Ratio(X)	0.36	0.00	0.00	0.00	0.00	0.04	0.18	0.00	0.18	0.01	0.41	0.00
Avail Cap(c_a), veh/h	925	0	777	0	0	823	662	0	1080	864	1081	918
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.9	0.0	0.0	0.0	0.0	12.5	5.3	0.0	3.0	3.4	3.5	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.0	0.0	0.1	0.6	0.0	0.4	0.0	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.9	0.0	2.4	0.0
LnGrp Delay(d),s/veh	14.4	0.0	0.0	0.0	0.0	12.5	5.9	0.0	3.4	3.4	4.7	0.0
LnGrp LOS	B					B	A		A	A	A	
Approach Vol, veh/h		139			8			320			447	
Approach Delay, s/veh		14.4			12.5			4.4			4.6	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		24.0		8.7		24.0		8.7
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		19.5		16.5		19.5		16.5
Max Q Clear Time (g_c+I1), s		8.8		5.2		6.2		2.1
Green Ext Time (p_c), s		3.5		0.5		3.9		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	5	21	51	5	27	13	137	8	78	86	14
Future Vol, veh/h	9	5	21	51	5	27	13	137	8	78	86	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	110	-	-	110	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	5	23	55	5	29	14	149	9	85	93	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	470	457	101	467	460	153	109	0	0	158	0	0
Stage 1	271	271	-	182	182	-	-	-	-	-	-	-
Stage 2	199	186	-	285	278	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	504	500	954	506	498	893	1481	-	-	1422	-	-
Stage 1	735	685	-	820	749	-	-	-	-	-	-	-
Stage 2	803	746	-	722	680	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	458	466	954	464	464	893	1481	-	-	1422	-	-
Mov Cap-2 Maneuver	458	466	-	464	464	-	-	-	-	-	-	-
Stage 1	728	644	-	812	742	-	-	-	-	-	-	-
Stage 2	764	739	-	657	639	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	12.8	0.6	3.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1481	-	-	668	550	1422	-	-
HCM Lane V/C Ratio	0.01	-	-	0.057	0.164	0.06	-	-
HCM Control Delay (s)	7.5	-	-	10.7	12.8	7.7	-	-
HCM Lane LOS	A	-	-	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.6	0.2	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	9	13	3	39	23
Future Vol, veh/h	6	9	13	3	39	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	10	14	3	42	25

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	126	16	0	0	17	0
Stage 1	16	-	-	-	-	-
Stage 2	110	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	869	1063	-	-	1600	-
Stage 1	1007	-	-	-	-	-
Stage 2	915	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	846	1063	-	-	1600	-
Mov Cap-2 Maneuver	846	-	-	-	-	-
Stage 1	1007	-	-	-	-	-
Stage 2	890	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	4.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	964	1600	-
HCM Lane V/C Ratio	-	-	0.017	0.026	-
HCM Control Delay (s)	-	-	8.8	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	89	23	15	267	287	82
Future Vol, veh/h	89	23	15	267	287	82
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	97	25	16	290	312	89

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	680	357	401	0	-	0
Stage 1	357	-	-	-	-	-
Stage 2	323	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	417	687	1158	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	734	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	410	687	1158	-	-	-
Mov Cap-2 Maneuver	410	-	-	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	722	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1158	-	447	-	-
HCM Lane V/C Ratio	0.014	-	0.272	-	-
HCM Control Delay (s)	8.2	0	16	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	1.1	-	-

Intersection	
Intersection Delay, s/veh	12.2
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	11	356	14	13	403
Future Vol, veh/h	12	11	356	14	13	403
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	12	387	15	14	438
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	8.8	11.8	12.8
HCM LOS	A	B	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	52%	3%
Vol Thru, %	96%	0%	97%
Vol Right, %	4%	48%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	370	23	416
LT Vol	0	12	13
Through Vol	356	0	403
RT Vol	14	11	0
Lane Flow Rate	402	25	452
Geometry Grp	1	1	1
Degree of Util (X)	0.496	0.039	0.555
Departure Headway (Hd)	4.438	5.561	4.418
Convergence, Y/N	Yes	Yes	Yes
Cap	812	642	818
Service Time	2.459	3.613	2.438
HCM Lane V/C Ratio	0.495	0.039	0.553
HCM Control Delay	11.8	8.8	12.8
HCM Lane LOS	B	A	B
HCM 95th-tile Q	2.8	0.1	3.5

HCM 2010 Signalized Intersection Summary
9: Washington St & 32nd Ave

09/21/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	465	350	285	40	235	75	365	1015	70	125	1120	640
Future Volume (veh/h)	465	350	285	40	235	75	365	1015	70	125	1120	640
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1850	1832	1779	1832	1814	1814	1814	1779	1814	1832	1832
Adj Flow Rate, veh/h	596	402	0	89	276	0	480	1285	0	179	1273	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	1	1	2	1
Peak Hour Factor	0.78	0.87	0.96	0.45	0.85	0.75	0.76	0.79	0.75	0.70	0.88	0.97
Percent Heavy Veh, %	1	0	1	4	1	2	2	2	4	2	1	1
Cap, veh/h	552	495	417	109	309	260	464	1383	607	179	1250	559
Arrive On Green	0.16	0.27	0.00	0.06	0.17	0.00	0.14	0.40	0.00	0.10	0.36	0.00
Sat Flow, veh/h	3384	1850	1557	1694	1832	1542	3351	3446	1512	1727	3480	1557
Grp Volume(v), veh/h	596	402	0	89	276	0	480	1285	0	179	1273	0
Grp Sat Flow(s),veh/h/ln	1692	1850	1557	1694	1832	1542	1676	1723	1512	1727	1740	1557
Q Serve(g_s), s	22.0	27.5	0.0	7.0	19.9	0.0	18.7	48.0	0.0	14.0	48.5	0.0
Cycle Q Clear(g_c), s	22.0	27.5	0.0	7.0	19.9	0.0	18.7	48.0	0.0	14.0	48.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	552	495	417	109	309	260	464	1383	607	179	1250	559
V/C Ratio(X)	1.08	0.81	0.00	0.82	0.89	0.00	1.03	0.93	0.00	1.00	1.02	0.00
Avail Cap(c_a), veh/h	552	495	417	125	326	274	464	1383	607	179	1250	559
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.90	0.90	0.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	56.5	46.3	0.0	62.4	54.9	0.0	58.2	38.6	0.0	60.5	43.3	0.0
Incr Delay (d2), s/veh	61.9	11.1	0.0	25.9	26.1	0.0	48.8	11.3	0.0	61.5	28.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.0	15.6	0.0	4.1	12.3	0.0	11.8	25.0	0.0	9.7	28.1	0.0
LnGrp Delay(d),s/veh	118.4	57.4	0.0	88.3	81.0	0.0	106.9	49.9	0.0	122.0	71.3	0.0
LnGrp LOS	F	E		F	F		F	D		F	F	
Approach Vol, veh/h		998			365			1765			1452	
Approach Delay, s/veh		93.8			82.8			65.4			77.5	
Approach LOS		F			F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.2	54.5	13.7	42.6	19.0	59.7	27.0	29.3
Change Period (Y+Rc), s	5.5	* 6	5.0	6.5	5.0	5.5	5.0	6.5
Max Green Setting (Gmax), s	18.0	* 49	10.0	36.0	14.0	53.0	22.0	24.0
Max Q Clear Time (g_c+I1), s	20.7	50.5	9.0	29.5	16.0	50.0	24.0	21.9
Green Ext Time (p_c), s	0.0	0.0	0.0	2.8	0.0	2.7	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	76.8
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	705	75	95	760	45	150	190	60	60	250	70
Future Volume (veh/h)	90	705	75	95	760	45	150	190	60	60	250	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814
Adj Flow Rate, veh/h	98	766	82	103	826	49	163	207	65	65	272	76
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	228	995	845	261	995	845	304	547	465	353	547	465
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	631	1814	1542	647	1814	1542	1029	1814	1542	1103	1814	1542
Grp Volume(v), veh/h	98	766	82	103	826	49	163	207	65	65	272	76
Grp Sat Flow(s),veh/h/ln	631	1814	1542	647	1814	1542	1029	1814	1542	1103	1814	1542
Q Serve(g_s), s	9.1	19.8	1.5	8.9	22.7	0.9	9.3	5.4	1.8	3.0	7.4	2.2
Cycle Q Clear(g_c), s	31.8	19.8	1.5	28.7	22.7	0.9	16.7	5.4	1.8	8.4	7.4	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	228	995	845	261	995	845	304	547	465	353	547	465
V/C Ratio(X)	0.43	0.77	0.10	0.39	0.83	0.06	0.54	0.38	0.14	0.18	0.50	0.16
Avail Cap(c_a), veh/h	228	995	845	261	995	845	304	547	465	353	547	465
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.4	10.6	6.5	21.8	11.2	6.3	24.1	16.5	15.3	19.8	17.2	15.4
Incr Delay (d2), s/veh	5.8	5.7	0.2	4.4	8.0	0.1	6.7	2.0	0.6	1.1	3.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	11.4	0.7	1.9	13.2	0.4	3.2	3.0	0.9	1.0	4.2	1.0
LnGrp Delay(d),s/veh	30.3	16.3	6.7	26.2	19.3	6.5	30.7	18.5	15.9	21.0	20.4	16.1
LnGrp LOS	C	B	A	C	B	A	C	B	B	C	C	B
Approach Vol, veh/h		946			978			435			413	
Approach Delay, s/veh		16.9			19.4			22.7			19.7	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		22.6		37.4		22.6		37.4
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		18.1		32.9		18.1		32.9
Max Q Clear Time (g_c+I1), s		18.7		33.8		10.4		30.7
Green Ext Time (p_c), s		0.0		0.0		2.7		2.0

Intersection Summary	
HCM 2010 Ctrl Delay	19.1
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	235	200	140	185	140	90	1260	135	125	1420	220
Future Volume (veh/h)	205	235	200	140	185	140	90	1260	135	125	1420	220
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1832	1850	1850	1832	1832	1832	1832	1850	1850	1832	1850
Adj Flow Rate, veh/h	236	305	233	165	203	152	108	1340	196	184	1527	259
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.77	0.86	0.85	0.91	0.92	0.83	0.94	0.69	0.68	0.93	0.85
Percent Heavy Veh, %	2	1	0	0	1	1	1	1	0	0	1	0
Cap, veh/h	253	295	412	197	295	424	177	1474	770	196	1450	760
Arrive On Green	0.07	0.16	0.16	0.07	0.16	0.16	0.10	0.42	0.42	0.11	0.42	0.42
Sat Flow, veh/h	1727	1832	1570	1762	1832	1557	1744	3480	1571	1762	3480	1572
Grp Volume(v), veh/h	236	305	233	165	203	152	108	1340	196	184	1527	259
Grp Sat Flow(s),veh/h/ln	1727	1832	1570	1762	1832	1557	1744	1740	1571	1762	1740	1572
Q Serve(g_s), s	6.0	14.5	1.9	6.0	9.4	7.1	5.3	32.5	6.5	9.3	37.5	4.1
Cycle Q Clear(g_c), s	6.0	14.5	1.9	6.0	9.4	7.1	5.3	32.5	6.5	9.3	37.5	4.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	253	295	412	197	295	424	177	1474	770	196	1450	760
V/C Ratio(X)	0.93	1.03	0.57	0.84	0.69	0.36	0.61	0.91	0.25	0.94	1.05	0.34
Avail Cap(c_a), veh/h	253	295	412	197	295	424	177	1474	770	196	1450	760
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89	0.26	0.26	0.26
Uniform Delay (d), s/veh	35.8	37.8	13.4	32.5	35.6	26.4	38.7	24.3	13.4	39.7	26.3	4.6
Incr Delay (d2), s/veh	38.3	61.3	2.5	26.0	7.7	0.9	4.0	8.9	0.7	19.6	29.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	12.3	3.5	2.6	5.4	3.1	2.8	17.3	3.0	5.6	23.8	1.8
LnGrp Delay(d),s/veh	74.1	99.1	16.0	58.5	43.4	27.3	42.7	33.3	14.1	59.3	55.5	4.9
LnGrp LOS	E	F	B	E	D	C	D	C	B	E	F	A
Approach Vol, veh/h		774			520			1644			1970	
Approach Delay, s/veh		66.4			43.5			31.6			49.2	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.7	44.0	11.0	21.0	15.0	44.7	11.0	21.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 38	6.0	14.5	10.0	36.5	6.0	14.5
Max Q Clear Time (g_c+I1), s	7.3	39.5	8.0	16.5	11.3	34.5	8.0	11.4
Green Ext Time (p_c), s	0.8	0.0	0.0	0.0	0.0	1.9	0.0	1.9

Intersection Summary	
HCM 2010 Ctrl Delay	45.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	185	15	85	135	65	105	1590	115	155	1510	275
Future Volume (veh/h)	170	185	15	85	135	65	105	1590	115	155	1510	275
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1850	1850	1850	1850	1850	1850	1850	1850	1832	1850	1850
Adj Flow Rate, veh/h	221	234	23	101	144	87	140	1787	147	242	1864	387
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.77	0.79	0.65	0.84	0.94	0.75	0.75	0.89	0.78	0.64	0.81	0.71
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	1	0	0
Cap, veh/h	226	235	694	164	235	417	554	2592	1256	242	1933	962
Arrive On Green	0.06	0.13	0.13	0.06	0.13	0.13	0.31	0.74	0.74	0.14	0.55	0.55
Sat Flow, veh/h	1762	1850	1572	1762	1850	1572	1762	3515	1572	1744	3515	1572
Grp Volume(v), veh/h	221	234	23	101	144	87	140	1787	147	242	1864	387
Grp Sat Flow(s),veh/h/ln	1762	1850	1572	1762	1850	1572	1762	1758	1572	1744	1758	1572
Q Serve(g_s), s	8.0	16.4	0.2	6.4	9.6	5.6	7.7	35.3	2.7	18.0	66.0	15.0
Cycle Q Clear(g_c), s	8.0	16.4	0.2	6.4	9.6	5.6	7.7	35.3	2.7	18.0	66.0	15.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	226	235	694	164	235	417	554	2592	1256	242	1933	962
V/C Ratio(X)	0.98	1.00	0.03	0.61	0.61	0.21	0.25	0.69	0.12	1.00	0.96	0.40
Avail Cap(c_a), veh/h	226	235	694	164	235	417	554	2592	1256	242	1933	962
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	0.85	0.85	0.85
Uniform Delay (d), s/veh	54.0	56.7	24.4	46.5	53.7	37.1	33.2	9.1	2.9	56.0	28.0	19.5
Incr Delay (d2), s/veh	53.3	57.7	0.0	7.2	6.0	0.4	0.1	1.4	0.2	54.0	12.2	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	12.2	0.5	3.4	5.3	2.5	3.7	17.4	1.2	12.3	35.1	6.7
LnGrp Delay(d),s/veh	107.2	114.5	24.4	53.7	59.8	37.6	33.3	10.5	3.1	110.0	40.2	20.6
LnGrp LOS	F	F	C	D	E	D	C	B	A	F	D	C
Approach Vol, veh/h		478			332			2074			2493	
Approach Delay, s/veh		106.8			52.1			11.5			43.9	
Approach LOS		F			D			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	47.6	78.0	13.0	23.0	23.0	102.6	13.0	23.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	41.0	* 72	8.0	16.5	18.0	64.5	8.0	16.5
Max Q Clear Time (g_c+I1), s	10.0	68.0	8.4	18.4	20.0	37.3	10.0	11.6
Green Ext Time (p_c), s	0.1	3.4	0.0	0.0	0.0	23.7	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	37.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	370	165	30	45	90	75	980	60	380	965	80
Future Volume (veh/h)	75	370	165	30	45	90	75	980	60	380	965	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	82	402	179	33	49	98	82	1065	65	413	1049	87
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	411	349	41	344	293	104	1143	70	422	1829	818
Arrive On Green	0.06	0.23	0.23	0.02	0.19	0.19	0.06	0.35	0.35	0.24	0.53	0.53
Sat Flow, veh/h	1727	1814	1542	1727	1814	1542	1727	3300	201	1727	3446	1542
Grp Volume(v), veh/h	82	402	179	33	49	98	82	556	574	413	1049	87
Grp Sat Flow(s),veh/h/ln	1727	1814	1542	1727	1814	1542	1727	1723	1778	1727	1723	1542
Q Serve(g_s), s	5.2	24.2	11.2	2.1	2.5	6.0	5.2	34.3	34.3	26.1	22.6	3.1
Cycle Q Clear(g_c), s	5.2	24.2	11.2	2.1	2.5	6.0	5.2	34.3	34.3	26.1	22.6	3.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	104	411	349	41	344	293	104	597	616	422	1829	818
V/C Ratio(X)	0.79	0.98	0.51	0.81	0.14	0.33	0.79	0.93	0.93	0.98	0.57	0.11
Avail Cap(c_a), veh/h	187	411	349	64	344	293	184	597	616	422	1829	818
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	51.0	42.3	37.2	53.5	37.1	38.6	51.0	34.7	34.7	41.3	17.4	12.8
Incr Delay (d2), s/veh	12.4	38.8	1.3	32.0	0.2	0.7	12.4	23.3	22.9	35.7	1.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	16.6	4.9	1.4	1.3	2.6	2.8	20.1	20.7	16.6	10.9	1.4
LnGrp Delay(d),s/veh	63.4	81.1	38.5	85.5	37.3	39.2	63.4	58.0	57.6	77.0	18.6	13.1
LnGrp LOS	E	F	D	F	D	D	E	E	E	E	B	B
Approach Vol, veh/h		663			180			1212			1549	
Approach Delay, s/veh		67.4			47.2			58.2			33.9	
Approach LOS		E			D			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	31.4	42.1	7.1	29.4	11.1	62.4	11.1	25.4
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.0	4.5	4.5
Max Green Setting (Gmax), s	26.9	36.6	4.1	24.9	11.7	51.8	11.9	17.1
Max Q Clear Time (g_c+I1), s	28.1	36.3	4.1	26.2	7.2	24.6	7.2	8.0
Green Ext Time (p_c), s	0.0	0.3	0.0	0.0	0.1	18.3	0.1	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	48.9
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	69
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	335	55	210	260	10	30	230	135	5	270	40
Future Vol, veh/h	50	335	55	210	260	10	30	230	135	5	270	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	364	60	228	283	11	33	250	147	5	293	43
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	93.1	35	95.2	54.4
HCM LOS	F	D	F	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	100%	0%	100%	0%	2%
Vol Thru, %	58%	0%	86%	0%	96%	86%
Vol Right, %	34%	0%	14%	0%	4%	13%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	395	50	390	210	270	315
LT Vol	30	50	0	210	0	5
Through Vol	230	0	335	0	260	270
RT Vol	135	0	55	0	10	40
Lane Flow Rate	429	54	424	228	293	342
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	1.065	0.148	1.087	0.63	0.767	0.882
Departure Headway (Hd)	9.294	10.23	9.6	10.574	10.019	9.906
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	395	353	382	345	364	370
Service Time	7.294	7.93	7.3	8.274	7.719	7.906
HCM Lane V/C Ratio	1.086	0.153	1.11	0.661	0.805	0.924
HCM Control Delay	95.2	14.7	103.1	29.7	39.1	54.4
HCM Lane LOS	F	B	F	D	E	F
HCM 95th-tile Q	14.1	0.5	14.6	4.1	6.2	8.6

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	40	35	360	525	110
Future Vol, veh/h	65	40	35	360	525	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	43	38	391	571	120

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1097	630	690	0	-	0
Stage 1	630	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	236	482	905	-	-	-
Stage 1	531	-	-	-	-	-
Stage 2	631	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	223	482	905	-	-	-
Mov Cap-2 Maneuver	223	-	-	-	-	-
Stage 1	531	-	-	-	-	-
Stage 2	597	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.4	0.8	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	905	-	280	-	-
HCM Lane V/C Ratio	0.042	-	0.408	-	-
HCM Control Delay (s)	9.2	0	26.4	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.1	-	1.9	-	-

Intersection	
Intersection Delay, s/veh	54.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	210	50	65	5	15	5	80	260	10	10	375	245
Future Vol, veh/h	210	50	65	5	15	5	80	260	10	10	375	245
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	228	54	71	5	16	5	87	283	11	11	408	266
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	22.7	11.9	22.3	90.8
HCM LOS	C	B	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	23%	65%	20%	2%
Vol Thru, %	74%	15%	60%	60%
Vol Right, %	3%	20%	20%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	350	325	25	630
LT Vol	80	210	5	10
Through Vol	260	50	15	375
RT Vol	10	65	5	245
Lane Flow Rate	380	353	27	685
Geometry Grp	1	1	1	1
Degree of Util (X)	0.674	0.661	0.059	1.103
Departure Headway (Hd)	6.655	7.051	8.355	5.798
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	548	516	431	623
Service Time	4.655	5.051	6.355	3.882
HCM Lane V/C Ratio	0.693	0.684	0.063	1.1
HCM Control Delay	22.3	22.7	11.9	90.8
HCM Lane LOS	C	C	B	F
HCM 95th-tile Q	5	4.8	0.2	20.3

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	95	35	205	10	10	5	90	170	10	15	210	140
Future Vol, veh/h	95	35	205	10	10	5	90	170	10	15	210	140
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	103	38	223	11	11	5	98	185	11	16	228	152

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	731	728	304	853	799	190	380	0	0	196	0	0
Stage 1	337	337	-	386	386	-	-	-	-	-	-	-
Stage 2	394	391	-	467	413	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	337	350	736	279	319	852	1178	-	-	1377	-	-
Stage 1	677	641	-	637	610	-	-	-	-	-	-	-
Stage 2	631	607	-	576	594	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	299	313	736	162	285	852	1178	-	-	1377	-	-
Mov Cap-2 Maneuver	299	313	-	162	285	-	-	-	-	-	-	-
Stage 1	614	631	-	578	553	-	-	-	-	-	-	-
Stage 2	557	551	-	372	585	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.4	21.7	2.8	0.3
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1178	-	-	299	615	243	1377	-	-
HCM Lane V/C Ratio	0.083	-	-	0.345	0.424	0.112	0.012	-	-
HCM Control Delay (s)	8.3	0	-	23.3	15.1	21.7	7.6	0	-
HCM Lane LOS	A	A	-	C	C	C	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	1.5	2.1	0.4	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	680	365	705	840	145	145	920	485	120	1195	240
Future Volume (veh/h)	260	680	365	705	840	145	145	920	485	120	1195	240
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1832	1850	1832	1832	1832	1832	1814	1814	1832	1832	1832
Adj Flow Rate, veh/h	277	782	0	810	1120	0	184	1000	0	140	1313	0
Adj No. of Lanes	2	2	1	2	2	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.87	0.69	0.87	0.75	0.44	0.79	0.92	0.87	0.86	0.91	0.81
Percent Heavy Veh, %	1	1	0	1	1	1	1	2	2	1	1	1
Cap, veh/h	291	790	357	703	1200	537	136	1219	546	187	1231	551
Arrive On Green	0.09	0.23	0.00	0.21	0.34	0.00	0.05	0.35	0.00	0.05	0.35	0.00
Sat Flow, veh/h	3384	3480	1572	3384	3480	1557	1744	3446	1542	1744	3480	1557
Grp Volume(v), veh/h	277	782	0	810	1120	0	184	1000	0	140	1313	0
Grp Sat Flow(s),veh/h/ln	1692	1740	1572	1692	1740	1557	1744	1723	1542	1744	1740	1557
Q Serve(g_s), s	10.6	29.1	0.0	27.0	40.4	0.0	6.0	34.3	0.0	6.0	46.0	0.0
Cycle Q Clear(g_c), s	10.6	29.1	0.0	27.0	40.4	0.0	6.0	34.3	0.0	6.0	46.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	291	790	357	703	1200	537	136	1219	546	187	1231	551
V/C Ratio(X)	0.95	0.99	0.00	1.15	0.93	0.00	1.35	0.82	0.00	0.75	1.07	0.00
Avail Cap(c_a), veh/h	291	790	357	703	1218	545	136	1219	546	187	1231	551
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.39	0.39	0.00	1.00	1.00	0.00	0.59	0.59	0.00	0.85	0.85	0.00
Uniform Delay (d), s/veh	59.1	50.1	0.0	51.5	41.2	0.0	36.0	38.2	0.0	34.7	42.0	0.0
Incr Delay (d2), s/veh	21.5	17.7	0.0	84.3	13.2	0.0	185.1	3.8	0.0	11.9	43.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	15.9	0.0	20.8	21.6	0.0	7.0	16.9	0.0	2.8	29.5	0.0
LnGrp Delay(d),s/veh	80.7	67.8	0.0	135.8	54.3	0.0	221.1	42.0	0.0	46.6	85.5	0.0
LnGrp LOS	F	E		F	D		F	D		D	F	
Approach Vol, veh/h		1059			1930			1184			1453	
Approach Delay, s/veh		71.1			88.5			69.9			81.7	
Approach LOS		E			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	52.0	16.7	50.3	11.0	52.0	32.0	35.0
Change Period (Y+Rc), s	5.0	6.0	5.5	* 5.5	5.0	6.0	5.0	5.5
Max Green Setting (Gmax), s	6.0	46.0	11.0	* 46	6.0	46.0	27.0	29.5
Max Q Clear Time (g_c+I1), s	8.0	48.0	12.6	42.4	8.0	36.3	29.0	31.1
Green Ext Time (p_c), s	0.0	0.0	0.0	2.4	0.0	9.2	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	79.6
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	15	680	0	5	5	145	230	5	10	515	195
Future Volume (veh/h)	205	15	680	0	5	5	145	230	5	10	515	195
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1814	1814	1850	1814	1850	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	223	16	0	0	5	5	158	250	5	11	560	0
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	407	20	338	0	183	183	511	1103	22	754	1129	960
Arrive On Green	0.22	0.22	0.00	0.00	0.22	0.22	0.62	0.62	0.62	0.62	0.62	0.00
Sat Flow, veh/h	1297	93	1542	0	833	833	846	1772	35	1120	1814	1542
Grp Volume(v), veh/h	239	0	0	0	0	10	158	0	255	11	560	0
Grp Sat Flow(s),veh/h/ln	1390	0	1542	0	0	1667	846	0	1807	1120	1814	1542
Q Serve(g_s), s	9.1	0.0	0.0	0.0	0.0	0.3	7.1	0.0	3.5	0.2	9.6	0.0
Cycle Q Clear(g_c), s	9.3	0.0	0.0	0.0	0.0	0.3	16.8	0.0	3.5	3.8	9.6	0.0
Prop In Lane	0.93		1.00	0.00		0.50	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	427	0	338	0	0	366	511	0	1126	754	1129	960
V/C Ratio(X)	0.56	0.00	0.00	0.00	0.00	0.03	0.31	0.00	0.23	0.01	0.50	0.00
Avail Cap(c_a), veh/h	1000	0	960	0	0	1038	511	0	1126	754	1129	960
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.1	0.0	0.0	0.0	0.0	17.5	10.4	0.0	4.7	5.6	5.9	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.5	0.0	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	0.0	0.0	0.0	0.1	1.9	0.0	1.8	0.1	5.2	0.0
LnGrp Delay(d),s/veh	22.3	0.0	0.0	0.0	0.0	17.5	12.0	0.0	5.2	5.6	7.4	0.0
LnGrp LOS	C					B	B		A	A	A	
Approach Vol, veh/h		239			10			413			571	
Approach Delay, s/veh		22.3			17.5			7.8			7.4	
Approach LOS		C			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.0		17.0		40.0		17.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		35.5		35.5		35.5		35.5
Max Q Clear Time (g_c+I1), s		18.8		11.3		11.6		2.3
Green Ext Time (p_c), s		5.9		1.4		6.9		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	10.5
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	20.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	10	40	125	55	90	30	320	20	105	120	20
Future Vol, veh/h	15	10	40	125	55	90	30	320	20	105	120	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	110	-	-	110	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	11	43	136	60	98	33	348	22	114	130	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	873	805	141	821	804	359	152	0	0	370	0	0
Stage 1	370	370	-	424	424	-	-	-	-	-	-	-
Stage 2	503	435	-	397	380	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	271	316	907	293	316	685	1429	-	-	1189	-	-
Stage 1	650	620	-	608	587	-	-	-	-	-	-	-
Stage 2	551	580	-	629	614	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	177	279	907	247	279	685	1429	-	-	1189	-	-
Mov Cap-2 Maneuver	177	279	-	247	279	-	-	-	-	-	-	-
Stage 1	635	561	-	594	573	-	-	-	-	-	-	-
Stage 2	413	567	-	531	555	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.1	65.5	0.6	3.6
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1429	-	-	395	324	1189	-	-
HCM Lane V/C Ratio	0.023	-	-	0.179	0.906	0.096	-	-
HCM Control Delay (s)	7.6	-	-	16.1	65.5	8.3	-	-
HCM Lane LOS	A	-	-	C	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	8.8	0.3	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	35	20	5	50	30
Future Vol, veh/h	25	35	20	5	50	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	38	22	5	54	33

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	165	24	0	0	27	0
Stage 1	24	-	-	-	-	-
Stage 2	141	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	826	1052	-	-	1587	-
Stage 1	999	-	-	-	-	-
Stage 2	886	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	797	1052	-	-	1587	-
Mov Cap-2 Maneuver	797	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	4.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	928	1587	-
HCM Lane V/C Ratio	-	-	0.07	0.034	-
HCM Control Delay (s)	-	-	9.2	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	80	20	25	430	435	125
Future Vol, veh/h	80	20	25	430	435	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	87	22	27	467	473	136

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1063	541	609	0	-	0
Stage 1	541	-	-	-	-	-
Stage 2	522	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	247	541	970	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	595	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	238	541	970	-	-	-
Mov Cap-2 Maneuver	238	-	-	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	572	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.3	0.5	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	970	-	268	-	-
HCM Lane V/C Ratio	0.028	-	0.406	-	-
HCM Control Delay (s)	8.8	0	27.3	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.1	-	1.9	-	-

Intersection	
Intersection Delay, s/veh	20.8
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	10	545	20	15	510
Future Vol, veh/h	15	10	545	20	15	510
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	592	22	16	554
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.7	22.3	19.8
HCM LOS	A	C	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	60%	3%
Vol Thru, %	96%	0%	97%
Vol Right, %	4%	40%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	565	25	525
LT Vol	0	15	15
Through Vol	545	0	510
RT Vol	20	10	0
Lane Flow Rate	614	27	571
Geometry Grp	1	1	1
Degree of Util (X)	0.784	0.048	0.739
Departure Headway (Hd)	4.597	6.39	4.661
Convergence, Y/N	Yes	Yes	Yes
Cap	786	564	776
Service Time	2.638	4.39	2.703
HCM Lane V/C Ratio	0.781	0.048	0.736
HCM Control Delay	22.3	9.7	19.8
HCM Lane LOS	C	A	C
HCM 95th-tile Q	7.9	0.2	6.7

HCM 2010 Signalized Intersection Summary
9: Washington St & 32nd Ave

09/21/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	440	330	270	45	245	75	340	950	65	120	1065	610
Future Volume (veh/h)	440	330	270	45	245	75	340	950	65	120	1065	610
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1850	1832	1779	1832	1814	1814	1814	1779	1814	1832	1832
Adj Flow Rate, veh/h	564	379	0	100	288	0	447	1203	0	171	1210	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	1	1	2	1
Peak Hour Factor	0.78	0.87	0.96	0.45	0.85	0.75	0.76	0.79	0.75	0.70	0.88	0.97
Percent Heavy Veh, %	1	0	1	4	1	2	2	2	4	2	1	1
Cap, veh/h	541	429	361	124	266	224	987	1876	823	173	1183	529
Arrive On Green	0.16	0.23	0.00	0.07	0.14	0.00	0.29	0.54	0.00	0.10	0.34	0.00
Sat Flow, veh/h	3384	1850	1557	1694	1832	1542	3351	3446	1512	1727	3480	1557
Grp Volume(v), veh/h	564	379	0	100	288	0	447	1203	0	171	1210	0
Grp Sat Flow(s),veh/h/ln	1692	1850	1557	1694	1832	1542	1676	1723	1512	1727	1740	1557
Q Serve(g_s), s	16.0	19.8	0.0	5.8	14.5	0.0	10.9	24.4	0.0	9.9	34.0	0.0
Cycle Q Clear(g_c), s	16.0	19.8	0.0	5.8	14.5	0.0	10.9	24.4	0.0	9.9	34.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	541	429	361	124	266	224	987	1876	823	173	1183	529
V/C Ratio(X)	1.04	0.88	0.00	0.80	1.08	0.00	0.45	0.64	0.00	0.99	1.02	0.00
Avail Cap(c_a), veh/h	541	429	361	152	266	224	987	1876	823	173	1183	529
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.90	0.90	0.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	42.0	37.1	0.0	45.6	42.8	0.0	28.7	15.9	0.0	44.9	33.0	0.0
Incr Delay (d2), s/veh	49.9	20.3	0.0	18.1	79.5	0.0	0.1	1.5	0.0	59.7	29.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.2	12.5	0.0	3.3	13.2	0.0	5.0	11.9	0.0	7.6	21.2	0.0
LnGrp Delay(d),s/veh	91.9	57.4	0.0	63.7	122.3	0.0	28.8	17.5	0.0	104.7	62.9	0.0
LnGrp LOS	F	E		E	F		C	B		F	F	
Approach Vol, veh/h		943			388			1650			1381	
Approach Delay, s/veh		78.0			107.2			20.5			68.1	
Approach LOS		E			F			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	35.3	40.0	12.3	29.7	15.0	60.3	21.0	21.0
Change Period (Y+Rc), s	5.5	* 6	5.0	6.5	5.0	5.5	5.0	6.5
Max Green Setting (Gmax), s	13.0	* 34	9.0	21.5	10.0	37.5	16.0	14.5
Max Q Clear Time (g_c+I1), s	12.9	36.0	7.8	21.8	11.9	26.4	18.0	16.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.7
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	645	65	90	715	45	135	170	55	55	235	65
Future Volume (veh/h)	80	645	65	90	715	45	135	170	55	55	235	65
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814
Adj Flow Rate, veh/h	87	701	71	98	777	49	147	185	60	60	255	71
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	270	1013	861	315	1013	861	305	529	450	359	529	450
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	661	1814	1542	695	1814	1542	1050	1814	1542	1130	1814	1542
Grp Volume(v), veh/h	87	701	71	98	777	49	147	185	60	60	255	71
Grp Sat Flow(s),veh/h/ln	661	1814	1542	695	1814	1542	1050	1814	1542	1130	1814	1542
Q Serve(g_s), s	7.0	16.7	1.3	7.1	19.9	0.9	8.1	4.8	1.7	2.7	7.0	2.1
Cycle Q Clear(g_c), s	26.9	16.7	1.3	23.8	19.9	0.9	15.0	4.8	1.7	7.5	7.0	2.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	270	1013	861	315	1013	861	305	529	450	359	529	450
V/C Ratio(X)	0.32	0.69	0.08	0.31	0.77	0.06	0.48	0.35	0.13	0.17	0.48	0.16
Avail Cap(c_a), veh/h	270	1013	861	315	1013	861	305	529	450	359	529	450
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.6	9.5	6.1	18.1	10.2	6.0	23.7	16.8	15.7	19.7	17.5	15.8
Incr Delay (d2), s/veh	3.1	3.9	0.2	2.6	5.6	0.1	5.4	1.8	0.6	1.0	3.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	9.3	0.6	1.6	11.3	0.4	2.8	2.7	0.8	0.9	3.9	1.0
LnGrp Delay(d),s/veh	23.8	13.4	6.3	20.7	15.8	6.2	29.1	18.6	16.3	20.7	20.6	16.5
LnGrp LOS	C	B	A	C	B	A	C	B	B	C	C	B
Approach Vol, veh/h		859			924			392			386	
Approach Delay, s/veh		13.9			15.8			22.2			19.9	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		22.0		38.0		22.0		38.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		17.5		33.5		17.5		33.5
Max Q Clear Time (g_c+I1), s		17.0		28.9		9.5		25.8
Green Ext Time (p_c), s		0.2		3.8		2.6		6.0

Intersection Summary	
HCM 2010 Ctrl Delay	16.8
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	240	210	165	220	170	85	1135	120	110	1235	190
Future Volume (veh/h)	210	240	210	165	220	170	85	1135	120	110	1235	190
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1832	1850	1850	1832	1832	1832	1832	1850	1850	1832	1850
Adj Flow Rate, veh/h	241	312	244	194	242	185	102	1207	174	162	1328	224
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.77	0.86	0.85	0.91	0.92	0.83	0.94	0.69	0.68	0.93	0.85
Percent Heavy Veh, %	2	1	0	0	1	1	1	1	0	0	1	0
Cap, veh/h	239	315	425	199	315	424	171	1463	765	176	1411	743
Arrive On Green	0.07	0.17	0.17	0.07	0.17	0.17	0.10	0.42	0.42	0.10	0.41	0.41
Sat Flow, veh/h	1727	1832	1570	1762	1832	1557	1744	3480	1571	1762	3480	1572
Grp Volume(v), veh/h	241	312	244	194	242	185	102	1207	174	162	1328	224
Grp Sat Flow(s),veh/h/ln	1727	1832	1570	1762	1832	1557	1744	1740	1571	1762	1740	1572
Q Serve(g_s), s	6.0	15.3	2.0	6.0	11.3	8.8	5.0	27.7	5.8	8.2	33.0	3.7
Cycle Q Clear(g_c), s	6.0	15.3	2.0	6.0	11.3	8.8	5.0	27.7	5.8	8.2	33.0	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	315	425	199	315	424	171	1463	765	176	1411	743
V/C Ratio(X)	1.01	0.99	0.57	0.97	0.77	0.44	0.60	0.82	0.23	0.92	0.94	0.30
Avail Cap(c_a), veh/h	239	315	425	199	315	424	174	1463	765	176	1411	743
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89	0.26	0.26	0.26
Uniform Delay (d), s/veh	35.7	37.2	13.0	33.8	35.5	27.0	38.9	23.1	13.3	40.1	25.7	4.7
Incr Delay (d2), s/veh	59.9	47.6	2.6	55.8	11.9	1.2	3.2	4.9	0.6	17.7	4.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	11.9	3.7	5.0	6.8	3.9	2.6	14.2	2.6	4.9	16.6	1.6
LnGrp Delay(d),s/veh	95.7	84.8	15.6	89.6	47.5	28.3	42.1	28.0	13.9	57.8	30.3	4.9
LnGrp LOS	F	F	B	F	D	C	D	C	B	E	C	A
Approach Vol, veh/h		797			621			1483			1714	
Approach Delay, s/veh		66.9			54.9			27.3			29.6	
Approach LOS		E			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.4	43.0	11.0	22.0	14.0	44.4	11.0	22.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 37	6.0	15.5	9.0	36.5	6.0	15.5
Max Q Clear Time (g_c+I1), s	7.0	35.0	8.0	17.3	10.2	29.7	8.0	13.3
Green Ext Time (p_c), s	1.2	1.4	0.0	0.0	0.0	5.8	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	38.7
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	180	15	110	175	80	100	1505	110	140	1370	250
Future Volume (veh/h)	165	180	15	110	175	80	100	1505	110	140	1370	250
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1850	1850	1850	1850	1850	1850	1850	1850	1832	1850	1850
Adj Flow Rate, veh/h	214	228	23	131	186	107	133	1691	141	219	1691	352
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.77	0.79	0.65	0.84	0.94	0.75	0.75	0.89	0.78	0.64	0.81	0.71
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	1	0	0
Cap, veh/h	221	227	750	194	227	393	624	2651	1300	222	1805	922
Arrive On Green	0.07	0.12	0.12	0.07	0.12	0.12	0.35	0.75	0.75	0.13	0.51	0.51
Sat Flow, veh/h	1762	1850	1572	1762	1850	1572	1762	3515	1572	1744	3515	1572
Grp Volume(v), veh/h	214	228	23	131	186	107	133	1691	141	219	1691	352
Grp Sat Flow(s),veh/h/ln	1762	1850	1572	1762	1850	1572	1762	1758	1572	1744	1758	1572
Q Serve(g_s), s	8.0	13.5	0.2	7.1	10.8	6.0	5.8	25.1	1.9	13.8	49.6	10.9
Cycle Q Clear(g_c), s	8.0	13.5	0.2	7.1	10.8	6.0	5.8	25.1	1.9	13.8	49.6	10.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	221	227	750	194	227	393	624	2651	1300	222	1805	922
V/C Ratio(X)	0.97	1.00	0.03	0.68	0.82	0.27	0.21	0.64	0.11	0.99	0.94	0.38
Avail Cap(c_a), veh/h	221	227	750	194	227	393	624	2651	1300	222	1805	922
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	0.85	0.85	0.85
Uniform Delay (d), s/veh	44.3	48.3	19.1	39.3	47.1	33.2	24.8	6.4	1.8	47.9	25.1	18.6
Incr Delay (d2), s/veh	51.4	60.8	0.0	9.5	21.9	0.6	0.1	1.1	0.2	51.7	9.4	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	10.7	0.4	4.0	6.9	2.7	2.8	12.4	0.8	9.8	26.3	4.9
LnGrp Delay(d),s/veh	95.7	109.1	19.1	48.8	68.9	33.8	24.9	7.5	2.0	99.6	34.5	19.6
LnGrp LOS	F	F	B	D	E	C	C	A	A	F	C	B
Approach Vol, veh/h		465			424			1965			2262	
Approach Delay, s/veh		98.5			53.9			8.3			38.5	
Approach LOS		F			D			A			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	45.7	63.0	13.0	20.0	19.0	89.7	13.0	20.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 57	8.0	13.5	14.0	51.5	8.0	13.5
Max Q Clear Time (g_c+I1), s	10.8	51.6	9.1	15.5	15.8	27.1	10.0	12.8
Green Ext Time (p_c), s	0.1	4.7	0.0	0.0	0.0	20.9	0.0	0.3

Intersection Summary	
HCM 2010 Ctrl Delay	33.6
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	390	175	30	45	90	65	860	50	350	885	70
Future Volume (veh/h)	75	390	175	30	45	90	65	860	50	350	885	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	82	424	190	33	49	98	71	935	54	380	962	76
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	437	372	43	373	317	91	1032	60	393	1678	751
Arrive On Green	0.06	0.24	0.24	0.02	0.21	0.21	0.05	0.31	0.31	0.23	0.49	0.49
Sat Flow, veh/h	1727	1814	1542	1727	1814	1542	1727	3312	191	1727	3446	1542
Grp Volume(v), veh/h	82	424	190	33	49	98	71	486	503	380	962	76
Grp Sat Flow(s),veh/h/ln	1727	1814	1542	1727	1814	1542	1727	1723	1780	1727	1723	1542
Q Serve(g_s), s	4.2	20.8	9.6	1.7	2.0	4.9	3.7	24.4	24.4	19.6	17.9	2.4
Cycle Q Clear(g_c), s	4.2	20.8	9.6	1.7	2.0	4.9	3.7	24.4	24.4	19.6	17.9	2.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	104	437	372	43	373	317	91	537	555	393	1678	751
V/C Ratio(X)	0.79	0.97	0.51	0.77	0.13	0.31	0.78	0.91	0.91	0.97	0.57	0.10
Avail Cap(c_a), veh/h	154	437	372	77	373	317	178	537	555	393	1678	751
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	41.7	33.8	29.6	43.6	29.2	30.3	42.1	29.7	29.7	34.4	16.4	12.5
Incr Delay (d2), s/veh	14.8	35.1	1.2	24.0	0.2	0.5	13.6	21.4	20.9	34.2	1.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	14.6	4.2	1.1	1.0	2.1	2.1	14.7	15.1	13.0	8.7	1.1
LnGrp Delay(d),s/veh	56.5	68.9	30.7	67.6	29.3	30.9	55.7	51.1	50.6	68.6	17.7	12.7
LnGrp LOS	E	E	C	E	C	C	E	D	D	E	B	B
Approach Vol, veh/h		696			180			1060			1418	
Approach Delay, s/veh		57.0			37.2			51.2			31.1	
Approach LOS		E			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.0	32.1	6.7	26.2	9.2	47.8	9.9	23.0
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.0	4.5	4.5
Max Green Setting (Gmax), s	20.5	26.3	4.0	21.7	9.3	37.5	8.0	17.7
Max Q Clear Time (g_c+I1), s	11.6	26.4	3.7	22.8	5.7	19.9	6.2	6.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	12.1	0.0	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	43.1
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	15.3
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	205	35	100	125	5	20	160	95	5	240	35
Future Vol, veh/h	30	205	35	100	125	5	20	160	95	5	240	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	223	38	109	136	5	22	174	103	5	261	38
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	15.8	12.6	15.8	16.4
HCM LOS	C	B	C	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	7%	100%	0%	100%	0%	2%
Vol Thru, %	58%	0%	85%	0%	96%	86%
Vol Right, %	35%	0%	15%	0%	4%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	275	30	240	100	130	280
LT Vol	20	30	0	100	0	5
Through Vol	160	0	205	0	125	240
RT Vol	95	0	35	0	5	35
Lane Flow Rate	299	33	261	109	141	304
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.516	0.068	0.5	0.23	0.278	0.534
Departure Headway (Hd)	6.218	7.514	6.896	7.623	7.081	6.315
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	580	476	522	471	506	569
Service Time	4.269	5.268	4.65	5.38	4.839	4.365
HCM Lane V/C Ratio	0.516	0.069	0.5	0.231	0.279	0.534
HCM Control Delay	15.8	10.8	16.4	12.7	12.6	16.4
HCM Lane LOS	C	B	C	B	B	C
HCM 95th-tile Q	2.9	0.2	2.8	0.9	1.1	3.1

Intersection	
Int Delay, s/veh	909.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	85	45	55	205	45	150	45	415	205	150	415	85
Future Vol, veh/h	85	45	55	205	45	150	45	415	205	150	415	85
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	92	49	60	223	49	163	49	451	223	163	451	92

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1589	1595	497	1538	1530	563	543	0	0	674	0	0
Stage 1	823	823	-	660	660	-	-	-	-	-	-	-
Stage 2	766	772	-	878	870	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 87	107	573	~ 94	117	526	1026	-	-	917	-	-
Stage 1	368	388	-	452	460	-	-	-	-	-	-	-
Stage 2	395	409	-	343	369	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 24	73	573	~ 30	80	526	1026	-	-	917	-	-
Mov Cap-2 Maneuver	~ 24	73	-	~ 30	80	-	-	-	-	-	-	-
Stage 1	339	288	-	416	424	-	-	-	-	-	-	-
Stage 2	222	377	-	~ 189	274	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 1843.5	$ 3463.6	0.6	2.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1026	-	-	43	52	917	-	-
HCM Lane V/C Ratio	0.048	-	-	4.676	8.361	0.178	-	-
HCM Control Delay (s)	8.7	0	-	$ 1843.5	$ 3463.6	9.8	0	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	23	51	0.6	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Intersection Delay, s/veh	51.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	215	50	70	5	15	5	75	250	10	10	370	240
Future Vol, veh/h	215	50	70	5	15	5	75	250	10	10	370	240
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	234	54	76	5	16	5	82	272	11	11	402	261
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	23.4	11.8	21.1	85.3
HCM LOS	C	B	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	22%	64%	20%	2%
Vol Thru, %	75%	15%	60%	60%
Vol Right, %	3%	21%	20%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	335	335	25	620
LT Vol	75	215	5	10
Through Vol	250	50	15	370
RT Vol	10	70	5	240
Lane Flow Rate	364	364	27	674
Geometry Grp	1	1	1	1
Degree of Util (X)	0.648	0.677	0.06	1.086
Departure Headway (Hd)	6.675	6.987	8.297	5.799
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	546	521	434	620
Service Time	4.675	4.987	6.297	3.891
HCM Lane V/C Ratio	0.667	0.699	0.062	1.087
HCM Control Delay	21.1	23.4	11.8	85.3
HCM Lane LOS	C	C	B	F
HCM 95th-tile Q	4.6	5.1	0.2	19.4

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	85	30	185	10	10	5	85	165	10	10	200	130
Future Vol, veh/h	85	30	185	10	10	5	85	165	10	10	200	130
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	92	33	201	11	11	5	92	179	11	11	217	141

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	688	685	288	797	750	185	359	0	0	190	0	0
Stage 1	310	310	-	370	370	-	-	-	-	-	-	-
Stage 2	378	375	-	427	380	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	360	371	751	305	340	857	1200	-	-	1384	-	-
Stage 1	700	659	-	650	620	-	-	-	-	-	-	-
Stage 2	644	617	-	606	614	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	323	336	751	192	308	857	1200	-	-	1384	-	-
Mov Cap-2 Maneuver	323	336	-	192	308	-	-	-	-	-	-	-
Stage 1	640	652	-	594	567	-	-	-	-	-	-	-
Stage 2	574	564	-	417	608	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.7	19.4	2.7	0.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1200	-	-	323	641	277	1384	-	-
HCM Lane V/C Ratio	0.077	-	-	0.286	0.365	0.098	0.008	-	-
HCM Control Delay (s)	8.2	0	-	20.6	13.8	19.4	7.6	0	-
HCM Lane LOS	A	A	-	C	B	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.2	1.7	0.3	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	570	310	580	690	120	130	805	425	110	1070	215
Future Volume (veh/h)	220	570	310	580	690	120	130	805	425	110	1070	215
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1832	1850	1832	1832	1832	1832	1814	1814	1832	1832	1832
Adj Flow Rate, veh/h	234	655	0	667	920	0	165	875	0	128	1176	0
Adj No. of Lanes	2	2	1	2	2	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.87	0.69	0.87	0.75	0.44	0.79	0.92	0.87	0.86	0.91	0.81
Percent Heavy Veh, %	1	1	0	1	1	1	1	2	2	1	1	1
Cap, veh/h	307	679	307	643	1007	450	178	1172	524	250	1183	529
Arrive On Green	0.09	0.20	0.00	0.19	0.29	0.00	0.06	0.34	0.00	0.06	0.34	0.00
Sat Flow, veh/h	3384	3480	1572	3384	3480	1557	1744	3446	1542	1744	3480	1557
Grp Volume(v), veh/h	234	655	0	667	920	0	165	875	0	128	1176	0
Grp Sat Flow(s),veh/h/ln	1692	1740	1572	1692	1740	1557	1744	1723	1542	1744	1740	1557
Q Serve(g_s), s	6.8	18.7	0.0	19.0	25.5	0.0	6.0	22.5	0.0	4.8	33.7	0.0
Cycle Q Clear(g_c), s	6.8	18.7	0.0	19.0	25.5	0.0	6.0	22.5	0.0	4.8	33.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	307	679	307	643	1007	450	178	1172	524	250	1183	529
V/C Ratio(X)	0.76	0.97	0.00	1.04	0.91	0.00	0.93	0.75	0.00	0.51	0.99	0.00
Avail Cap(c_a), veh/h	307	679	307	643	1027	459	178	1172	524	250	1183	529
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.39	0.39	0.00	1.00	1.00	0.00	0.59	0.59	0.00	0.85	0.85	0.00
Uniform Delay (d), s/veh	44.4	39.9	0.0	40.5	34.3	0.0	26.5	29.2	0.0	22.6	32.9	0.0
Incr Delay (d2), s/veh	3.9	14.3	0.0	45.5	12.5	0.0	32.7	2.6	0.0	0.6	22.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	10.3	0.0	12.9	14.0	0.0	3.3	11.1	0.0	2.3	19.9	0.0
LnGrp Delay(d),s/veh	48.3	54.2	0.0	86.0	46.8	0.0	59.2	31.8	0.0	23.2	55.5	0.0
LnGrp LOS	D	D		F	D		E	C		C	E	
Approach Vol, veh/h		889			1587			1040			1304	
Approach Delay, s/veh		52.7			63.3			36.2			52.4	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	40.0	14.6	34.4	11.0	40.0	24.0	25.0
Change Period (Y+Rc), s	5.0	6.0	5.5	* 5.5	5.0	6.0	5.0	5.5
Max Green Setting (Gmax), s	6.0	34.0	9.0	* 30	6.0	34.0	19.0	19.5
Max Q Clear Time (g_c+I1), s	8.0	35.7	8.8	27.5	6.8	24.5	21.0	20.7
Green Ext Time (p_c), s	0.0	0.0	0.2	1.4	0.0	8.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	52.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	10	390	0	5	5	90	145	5	10	445	170
Future Volume (veh/h)	115	10	390	0	5	5	90	145	5	10	445	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1814	1814	1850	1814	1850	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	125	11	0	0	5	5	98	158	5	11	484	0
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	347	14	199	0	107	107	642	1101	35	915	1142	971
Arrive On Green	0.13	0.13	0.00	0.00	0.13	0.13	0.63	0.63	0.63	0.63	0.63	0.00
Sat Flow, veh/h	1257	111	1542	0	833	833	908	1749	55	1218	1814	1542
Grp Volume(v), veh/h	136	0	0	0	0	10	98	0	163	11	484	0
Grp Sat Flow(s),veh/h/ln	1367	0	1542	0	0	1667	908	0	1804	1218	1814	1542
Q Serve(g_s), s	3.4	0.0	0.0	0.0	0.0	0.2	2.3	0.0	1.4	0.1	5.0	0.0
Cycle Q Clear(g_c), s	3.6	0.0	0.0	0.0	0.0	0.2	7.3	0.0	1.4	1.5	5.0	0.0
Prop In Lane	0.92		1.00	0.00		0.50	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	361	0	199	0	0	215	642	0	1136	915	1142	971
V/C Ratio(X)	0.38	0.00	0.00	0.00	0.00	0.05	0.15	0.00	0.14	0.01	0.42	0.00
Avail Cap(c_a), veh/h	846	0	723	0	0	782	642	0	1136	915	1142	971
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	15.8	0.0	0.0	0.0	0.0	14.2	5.3	0.0	2.8	3.1	3.5	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.0	0.0	0.1	0.5	0.0	0.3	0.0	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.0	0.0	0.0	0.1	0.7	0.0	0.8	0.1	2.8	0.0
LnGrp Delay(d),s/veh	16.5	0.0	0.0	0.0	0.0	14.3	5.8	0.0	3.1	3.1	4.6	0.0
LnGrp LOS	B					B	A		A	A	A	
Approach Vol, veh/h		136			10			261			495	
Approach Delay, s/veh		16.5			14.3			4.1			4.6	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		28.0		9.3		28.0		9.3
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		23.5		17.5		23.5		17.5
Max Q Clear Time (g_c+I1), s		9.3		5.6		7.0		2.2
Green Ext Time (p_c), s		4.0		0.5		4.3		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	142.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	85	145	125	55	90	55	605	35	55	65	10
Future Vol, veh/h	80	85	145	125	55	90	55	605	35	55	65	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	110	-	-	110	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	87	92	158	136	60	98	60	658	38	60	71	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1071	1011	76	1117	997	677	82	0	0	696	0	0
Stage 1	196	196	-	796	796	-	-	-	-	-	-	-
Stage 2	875	815	-	321	201	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	198	240	985	185	244	453	1515	-	-	900	-	-
Stage 1	806	739	-	380	399	-	-	-	-	-	-	-
Stage 2	344	391	-	691	735	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	113	215	985	~ 96	219	453	1515	-	-	900	-	-
Mov Cap-2 Maneuver	113	215	-	~ 96	219	-	-	-	-	-	-	-
Stage 1	774	690	-	365	383	-	-	-	-	-	-	-
Stage 2	219	376	-	469	686	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	224.3	$ 480.3	0.6	3.9
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1515	-	-	248	154	900	-	-
HCM Lane V/C Ratio	0.039	-	-	1.359	1.906	0.066	-	-
HCM Control Delay (s)	7.5	-	-	224.3	$ 480.3	9.3	-	-
HCM Lane LOS	A	-	-	F	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	18.1	22.4	0.2	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	4.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	80	165	40	65	35
Future Vol, veh/h	55	80	165	40	65	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	87	179	43	71	38

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	380	201	0	0	223	0
Stage 1	201	-	-	-	-	-
Stage 2	179	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	622	840	-	-	1346	-
Stage 1	833	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	588	840	-	-	1346	-
Mov Cap-2 Maneuver	588	-	-	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	806	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	5.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	715	1346	-
HCM Lane V/C Ratio	-	-	0.205	0.052	-
HCM Control Delay (s)	-	-	11.3	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-

Intersection	
Int Delay, s/veh	17.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	175	45	25	415	520	150
Future Vol, veh/h	175	45	25	415	520	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	190	49	27	451	565	163

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1152	647	728	0	-	0
Stage 1	647	-	-	-	-	-
Stage 2	505	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	219	471	876	-	-	-
Stage 1	521	-	-	-	-	-
Stage 2	606	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	210	471	876	-	-	-
Mov Cap-2 Maneuver	210	-	-	-	-	-
Stage 1	521	-	-	-	-	-
Stage 2	581	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	105.3	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	876	-	237	-	-
HCM Lane V/C Ratio	0.031	-	1.009	-	-
HCM Control Delay (s)	9.2	0	105.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	9.6	-	-

Intersection	
Intersection Delay, s/veh	39.1
Intersection LOS	E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	10	645	25	20	600
Future Vol, veh/h	15	10	645	25	20	600
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	701	27	22	652
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	10.2	44.1	34.8
HCM LOS	B	E	D

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	60%	3%
Vol Thru, %	96%	0%	97%
Vol Right, %	4%	40%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	670	25	620
LT Vol	0	15	20
Through Vol	645	0	600
RT Vol	25	10	0
Lane Flow Rate	728	27	674
Geometry Grp	1	1	1
Degree of Util (X)	0.955	0.052	0.898
Departure Headway (Hd)	4.723	6.844	4.798
Convergence, Y/N	Yes	Yes	Yes
Cap	765	526	748
Service Time	2.782	4.844	2.859
HCM Lane V/C Ratio	0.952	0.051	0.901
HCM Control Delay	44.1	10.2	34.8
HCM Lane LOS	E	B	D
HCM 95th-tile Q	14.4	0.2	11.8

HCM 2010 Signalized Intersection Summary
9: Washington St & 32nd Ave

09/21/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	445	335	270	50	280	85	340	950	65	115	1050	600
Future Volume (veh/h)	445	335	270	50	280	85	340	950	65	115	1050	600
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1850	1832	1779	1832	1814	1814	1814	1779	1814	1832	1832
Adj Flow Rate, veh/h	571	385	0	111	329	0	447	1203	0	164	1193	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	1	1	2	1
Peak Hour Factor	0.78	0.87	0.96	0.45	0.85	0.75	0.76	0.79	0.75	0.70	0.88	0.97
Percent Heavy Veh, %	1	0	1	4	1	2	2	2	4	2	1	1
Cap, veh/h	523	449	378	135	308	259	929	1833	804	173	1202	538
Arrive On Green	0.15	0.24	0.00	0.08	0.17	0.00	0.28	0.53	0.00	0.10	0.35	0.00
Sat Flow, veh/h	3384	1850	1557	1694	1832	1542	3351	3446	1512	1727	3480	1557
Grp Volume(v), veh/h	571	385	0	111	329	0	447	1203	0	164	1193	0
Grp Sat Flow(s),veh/h/ln	1692	1850	1557	1694	1832	1542	1676	1723	1512	1727	1740	1557
Q Serve(g_s), s	17.0	21.9	0.0	7.1	18.5	0.0	12.2	27.6	0.0	10.4	37.6	0.0
Cycle Q Clear(g_c), s	17.0	21.9	0.0	7.1	18.5	0.0	12.2	27.6	0.0	10.4	37.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	523	449	378	135	308	259	929	1833	804	173	1202	538
V/C Ratio(X)	1.09	0.86	0.00	0.82	1.07	0.00	0.48	0.66	0.00	0.95	0.99	0.00
Avail Cap(c_a), veh/h	523	449	378	139	308	259	929	1833	804	173	1202	538
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.90	0.90	0.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	46.5	39.8	0.0	49.8	45.8	0.0	33.2	18.5	0.0	49.2	35.9	0.0
Incr Delay (d2), s/veh	66.6	16.2	0.0	28.4	70.5	0.0	0.1	1.7	0.0	48.0	22.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.8	13.1	0.0	4.4	15.4	0.0	5.7	13.5	0.0	7.3	21.7	0.0
LnGrp Delay(d),s/veh	113.1	56.1	0.0	78.2	116.2	0.0	33.3	20.2	0.0	97.3	57.9	0.0
LnGrp LOS	F	E		E	F		C	C		F	E	
Approach Vol, veh/h		956			440			1650			1357	
Approach Delay, s/veh		90.2			106.6			23.7			62.7	
Approach LOS		F			F			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.5	44.0	13.8	33.2	16.0	64.5	22.0	25.0
Change Period (Y+Rc), s	5.5	* 6	5.0	6.5	5.0	5.5	5.0	6.5
Max Green Setting (Gmax), s	14.0	* 38	9.0	26.5	11.0	41.5	17.0	18.5
Max Q Clear Time (g_c+I1), s	14.2	39.6	9.1	23.9	12.4	29.6	19.0	20.5
Green Ext Time (p_c), s	0.0	0.0	0.0	1.4	0.0	9.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	58.4
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	650	70	90	715	45	140	175	55	55	230	65
Future Volume (veh/h)	80	650	70	90	715	45	140	175	55	55	230	65
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814
Adj Flow Rate, veh/h	87	707	76	98	777	49	152	190	60	60	250	71
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	256	973	827	296	973	827	329	544	462	376	544	462
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	661	1814	1542	688	1814	1542	1054	1814	1542	1125	1814	1542
Grp Volume(v), veh/h	87	707	76	98	777	49	152	190	60	60	250	71
Grp Sat Flow(s),veh/h/ln	661	1814	1542	688	1814	1542	1054	1814	1542	1125	1814	1542
Q Serve(g_s), s	6.8	16.3	1.3	6.9	19.1	0.8	7.5	4.5	1.6	2.4	6.2	1.9
Cycle Q Clear(g_c), s	25.9	16.3	1.3	23.2	19.1	0.8	13.7	4.5	1.6	6.9	6.2	1.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	256	973	827	296	973	827	329	544	463	376	544	463
V/C Ratio(X)	0.34	0.73	0.09	0.33	0.80	0.06	0.46	0.35	0.13	0.16	0.46	0.15
Avail Cap(c_a), veh/h	256	973	827	296	973	827	329	544	463	376	544	463
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.8	9.7	6.2	18.5	10.3	6.1	21.2	15.1	14.0	17.8	15.6	14.1
Incr Delay (d2), s/veh	3.6	4.7	0.2	3.0	6.8	0.1	4.6	1.8	0.6	0.9	2.8	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	9.3	0.6	1.6	11.1	0.4	2.6	2.5	0.7	0.8	3.5	0.9
LnGrp Delay(d),s/veh	24.4	14.4	6.4	21.5	17.2	6.2	25.8	16.8	14.6	18.7	18.4	14.8
LnGrp LOS	C	B	A	C	B	A	C	B	B	B	B	B
Approach Vol, veh/h		870			924			402			381	
Approach Delay, s/veh		14.7			17.0			19.9			17.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		21.0		34.0		21.0		34.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		16.5		29.5		16.5		29.5
Max Q Clear Time (g_c+I1), s		15.7		27.9		8.9		25.2
Green Ext Time (p_c), s		0.4		1.4		2.5		3.5

Intersection Summary	
HCM 2010 Ctrl Delay	16.8
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	220	190	135	180	140	80	1090	115	110	1215	190
Future Volume (veh/h)	190	220	190	135	180	140	80	1090	115	110	1215	190
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1832	1850	1850	1832	1832	1832	1832	1850	1850	1832	1850
Adj Flow Rate, veh/h	218	286	221	159	198	152	96	1160	167	162	1306	224
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.77	0.86	0.85	0.91	0.92	0.83	0.94	0.69	0.68	0.93	0.85
Percent Heavy Veh, %	2	1	0	0	1	1	1	1	0	0	1	0
Cap, veh/h	269	315	401	215	315	440	145	1375	726	194	1411	743
Arrive On Green	0.07	0.17	0.17	0.07	0.17	0.17	0.08	0.40	0.40	0.11	0.41	0.41
Sat Flow, veh/h	1727	1832	1570	1762	1832	1557	1744	3480	1571	1762	3480	1572
Grp Volume(v), veh/h	218	286	221	159	198	152	96	1160	167	162	1306	224
Grp Sat Flow(s),veh/h/ln	1727	1832	1570	1762	1832	1557	1744	1740	1571	1762	1740	1572
Q Serve(g_s), s	6.0	13.8	1.8	6.0	9.0	7.0	4.8	27.2	5.8	8.1	32.1	3.7
Cycle Q Clear(g_c), s	6.0	13.8	1.8	6.0	9.0	7.0	4.8	27.2	5.8	8.1	32.1	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	315	401	215	315	440	145	1375	726	194	1411	743
V/C Ratio(X)	0.81	0.91	0.55	0.74	0.63	0.35	0.66	0.84	0.23	0.83	0.93	0.30
Avail Cap(c_a), veh/h	269	315	401	215	315	440	174	1375	726	196	1411	743
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89	0.26	0.26	0.26
Uniform Delay (d), s/veh	34.1	36.5	12.7	31.2	34.6	25.7	40.0	24.7	14.6	39.2	25.5	4.4
Incr Delay (d2), s/veh	15.7	28.9	2.4	13.2	5.0	0.8	3.6	5.8	0.7	7.6	3.8	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	9.5	3.3	1.8	5.0	3.1	2.5	14.2	2.6	4.4	16.2	1.6
LnGrp Delay(d),s/veh	49.9	65.5	15.1	44.5	39.5	26.5	43.6	30.5	15.2	46.8	29.2	4.7
LnGrp LOS	D	E	B	D	D	C	D	C	B	D	C	A
Approach Vol, veh/h		725			509			1423			1692	
Approach Delay, s/veh		45.4			37.2			29.6			27.7	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	43.0	11.0	22.0	14.9	42.1	11.0	22.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 37	6.0	15.5	10.0	35.5	6.0	15.5
Max Q Clear Time (g_c+I1), s	5.8	34.1	8.0	15.8	10.1	29.2	8.0	11.0
Green Ext Time (p_c), s	1.5	2.2	0.0	0.0	0.0	5.3	0.0	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	32.4
HCM 2010 LOS	C

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	180	15	110	175	80	95	1490	110	135	1325	240
Future Volume (veh/h)	165	180	15	110	175	80	95	1490	110	135	1325	240
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1850	1850	1850	1850	1850	1850	1850	1850	1832	1850	1850
Adj Flow Rate, veh/h	214	228	23	131	186	107	127	1674	141	211	1636	338
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.77	0.79	0.65	0.84	0.94	0.75	0.75	0.89	0.78	0.64	0.81	0.71
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	1	0	0
Cap, veh/h	231	213	579	213	213	354	446	2261	1137	192	1705	888
Arrive On Green	0.08	0.12	0.12	0.08	0.12	0.12	0.25	0.64	0.64	0.11	0.49	0.49
Sat Flow, veh/h	1762	1850	1572	1762	1850	1572	1762	3515	1572	1744	3515	1572
Grp Volume(v), veh/h	214	228	23	131	186	107	127	1674	141	211	1636	338
Grp Sat Flow(s),veh/h/ln	1762	1850	1572	1762	1850	1572	1762	1758	1572	1744	1758	1572
Q Serve(g_s), s	8.0	11.5	0.2	6.5	9.9	5.7	5.8	32.4	2.7	11.0	44.8	5.6
Cycle Q Clear(g_c), s	8.0	11.5	0.2	6.5	9.9	5.7	5.8	32.4	2.7	11.0	44.8	5.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	231	213	579	213	213	354	446	2261	1137	192	1705	888
V/C Ratio(X)	0.93	1.07	0.04	0.62	0.87	0.30	0.28	0.74	0.12	1.10	0.96	0.38
Avail Cap(c_a), veh/h	231	213	579	213	213	354	446	2261	1137	192	1705	888
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	0.85	0.85	0.85
Uniform Delay (d), s/veh	39.7	44.3	16.2	35.7	43.5	32.2	30.1	12.2	4.2	44.5	24.8	9.1
Incr Delay (d2), s/veh	39.3	82.0	0.0	5.6	31.7	0.8	0.1	2.0	0.2	89.2	12.6	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	10.7	0.4	3.5	6.9	2.5	2.8	16.2	1.2	10.0	24.6	2.7
LnGrp Delay(d),s/veh	79.0	126.3	16.3	41.3	75.3	33.0	30.2	14.2	4.4	133.7	37.4	10.2
LnGrp LOS	E	F	B	D	E	C	C	B	A	F	D	B
Approach Vol, veh/h		465			424			1942			2185	
Approach Delay, s/veh		99.1			54.1			14.5			42.5	
Approach LOS		F			D			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	31.9	55.0	13.0	18.0	16.0	70.9	13.0	18.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 49	8.0	11.5	11.0	46.5	8.0	11.5
Max Q Clear Time (g_c+I1), s	10.8	46.8	8.5	13.5	13.0	34.4	10.0	11.9
Green Ext Time (p_c), s	0.1	1.6	0.0	0.0	0.0	10.9	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	37.9
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	410	185	30	45	90	65	870	50	355	895	70
Future Volume (veh/h)	80	410	185	30	45	90	65	870	50	355	895	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	87	446	201	33	49	98	71	946	54	386	973	76
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	110	463	393	41	390	332	91	1031	59	406	1701	761
Arrive On Green	0.06	0.26	0.26	0.02	0.22	0.22	0.05	0.31	0.31	0.23	0.49	0.49
Sat Flow, veh/h	1727	1814	1542	1727	1814	1542	1727	3314	189	1727	3446	1542
Grp Volume(v), veh/h	87	446	201	33	49	98	71	492	508	386	973	76
Grp Sat Flow(s),veh/h/ln	1727	1814	1542	1727	1814	1542	1727	1723	1780	1727	1723	1542
Q Serve(g_s), s	5.0	24.3	11.2	1.9	2.2	5.3	4.1	27.5	27.5	22.0	19.9	2.6
Cycle Q Clear(g_c), s	5.0	24.3	11.2	1.9	2.2	5.3	4.1	27.5	27.5	22.0	19.9	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	110	463	393	41	390	332	91	536	554	406	1701	761
V/C Ratio(X)	0.79	0.96	0.51	0.80	0.13	0.30	0.78	0.92	0.92	0.95	0.57	0.10
Avail Cap(c_a), veh/h	187	463	393	71	390	332	168	536	554	406	1701	761
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	46.1	36.8	31.9	48.6	31.7	32.9	46.8	33.2	33.2	37.7	17.9	13.5
Incr Delay (d2), s/veh	11.7	32.7	1.1	28.0	0.1	0.5	13.6	23.1	22.6	30.2	1.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	16.3	4.9	1.2	1.1	2.3	2.3	16.6	17.0	13.9	9.8	1.2
LnGrp Delay(d),s/veh	57.8	69.5	33.0	76.6	31.8	33.4	60.4	56.3	55.8	67.9	19.1	13.7
LnGrp LOS	E	E	C	E	C	C	E	E	E	E	B	B
Approach Vol, veh/h		734			180			1071			1435	
Approach Delay, s/veh		58.1			40.9			56.3			32.0	
Approach LOS		E			D			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.0	35.1	6.9	30.0	9.7	53.4	10.9	26.0
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.0	4.5	4.5
Max Green Setting (Gmax), s	23.5	29.4	4.1	25.5	9.7	43.2	10.8	18.8
Max Q Clear Time (g_c+I1), s	24.0	29.5	3.9	26.3	6.1	21.9	7.0	7.3
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	14.0	0.1	3.1

Intersection Summary	
HCM 2010 Ctrl Delay	45.7
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	14.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	195	30	90	115	5	20	155	90	5	240	35
Future Vol, veh/h	30	195	30	90	115	5	20	155	90	5	240	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	212	33	98	125	5	22	168	98	5	261	38
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	14.6	12	14.6	15.5
HCM LOS	B	B	B	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	100%	0%	100%	0%	2%
Vol Thru, %	58%	0%	87%	0%	96%	86%
Vol Right, %	34%	0%	13%	0%	4%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	265	30	225	90	120	280
LT Vol	20	30	0	90	0	5
Through Vol	155	0	195	0	115	240
RT Vol	90	0	30	0	5	35
Lane Flow Rate	288	33	245	98	130	304
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.483	0.067	0.459	0.203	0.251	0.517
Departure Headway (Hd)	6.042	7.369	6.761	7.48	6.937	6.114
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	596	486	533	480	518	590
Service Time	4.081	5.11	4.502	5.225	4.681	4.151
HCM Lane V/C Ratio	0.483	0.068	0.46	0.204	0.251	0.515
HCM Control Delay	14.6	10.6	15.1	12.1	12	15.5
HCM Lane LOS	B	B	C	B	B	C
HCM 95th-tile Q	2.6	0.2	2.4	0.8	1	3

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	40	30	270	390	85
Future Vol, veh/h	65	40	30	270	390	85
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	43	33	293	424	92

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	829	470	516	0	-	0
Stage 1	470	-	-	-	-	-
Stage 2	359	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	340	594	1050	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	707	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	327	594	1050	-	-	-
Mov Cap-2 Maneuver	327	-	-	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	680	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.8	0.9	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1050	-	395	-	-
HCM Lane V/C Ratio	0.031	-	0.289	-	-
HCM Control Delay (s)	8.5	0	17.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.2	-	-

Intersection	
Intersection Delay, s/veh	112
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	290	65	90	5	15	5	70	230	10	15	425	275
Future Vol, veh/h	290	65	90	5	15	5	70	230	10	15	425	275
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	315	71	98	5	16	5	76	250	11	16	462	299
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	47.4	13.1	23.6	194
HCM LOS	E	B	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	23%	65%	20%	2%
Vol Thru, %	74%	15%	60%	59%
Vol Right, %	3%	20%	20%	38%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	310	445	25	715
LT Vol	70	290	5	15
Through Vol	230	65	15	425
RT Vol	10	90	5	275
Lane Flow Rate	337	484	27	777
Geometry Grp	1	1	1	1
Degree of Util (X)	0.65	0.901	0.064	1.363
Departure Headway (Hd)	7.599	7.442	9.491	6.314
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	478	493	380	575
Service Time	5.599	5.442	7.491	4.405
HCM Lane V/C Ratio	0.705	0.982	0.071	1.351
HCM Control Delay	23.6	47.4	13.1	194
HCM Lane LOS	C	E	B	F
HCM 95th-tile Q	4.6	10.1	0.2	34

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	75	30	165	10	10	5	85	160	10	10	185	125
Future Vol, veh/h	75	30	165	10	10	5	85	160	10	10	185	125
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	82	33	179	11	11	5	92	174	11	11	201	136

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	663	661	269	761	723	179	337	0	0	185	0	0
Stage 1	291	291	-	364	364	-	-	-	-	-	-	-
Stage 2	372	370	-	397	359	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	375	383	770	322	352	864	1222	-	-	1390	-	-
Stage 1	717	672	-	655	624	-	-	-	-	-	-	-
Stage 2	648	620	-	629	627	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	337	347	770	213	319	864	1222	-	-	1390	-	-
Mov Cap-2 Maneuver	337	347	-	213	319	-	-	-	-	-	-	-
Stage 1	657	665	-	600	572	-	-	-	-	-	-	-
Stage 2	579	568	-	454	621	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.8	18.3	2.7	0.2
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1222	-	-	337	648	297	1390	-	-
HCM Lane V/C Ratio	0.076	-	-	0.242	0.327	0.091	0.008	-	-
HCM Control Delay (s)	8.2	0	-	19.1	13.2	18.3	7.6	0	-
HCM Lane LOS	A	A	-	C	B	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.9	1.4	0.3	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	215	555	300	570	680	115	130	805	425	105	1060	215
Future Volume (veh/h)	215	555	300	570	680	115	130	805	425	105	1060	215
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1832	1850	1832	1832	1832	1832	1814	1814	1832	1832	1832
Adj Flow Rate, veh/h	229	638	0	655	907	0	165	875	0	122	1165	0
Adj No. of Lanes	2	2	1	2	2	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.87	0.69	0.87	0.75	0.44	0.79	0.92	0.87	0.86	0.91	0.81
Percent Heavy Veh, %	1	1	0	1	1	1	1	2	2	1	1	1
Cap, veh/h	320	638	288	639	947	424	196	1129	505	256	1134	507
Arrive On Green	0.09	0.18	0.00	0.19	0.27	0.00	0.07	0.33	0.00	0.06	0.33	0.00
Sat Flow, veh/h	3384	3480	1572	3384	3480	1557	1744	3446	1542	1744	3480	1557
Grp Volume(v), veh/h	229	638	0	655	907	0	165	875	0	122	1165	0
Grp Sat Flow(s),veh/h/ln	1692	1740	1572	1692	1740	1557	1744	1723	1542	1744	1740	1557
Q Serve(g_s), s	5.9	16.5	0.0	17.0	23.1	0.0	5.7	20.6	0.0	4.1	29.3	0.0
Cycle Q Clear(g_c), s	5.9	16.5	0.0	17.0	23.1	0.0	5.7	20.6	0.0	4.1	29.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	320	638	288	639	947	424	196	1129	505	256	1134	507
V/C Ratio(X)	0.72	1.00	0.00	1.02	0.96	0.00	0.84	0.77	0.00	0.48	1.03	0.00
Avail Cap(c_a), veh/h	338	638	288	639	947	424	196	1129	505	259	1134	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.39	0.39	0.00	1.00	1.00	0.00	0.59	0.59	0.00	0.85	0.85	0.00
Uniform Delay (d), s/veh	39.6	36.7	0.0	36.5	32.2	0.0	23.1	27.3	0.0	20.8	30.3	0.0
Incr Delay (d2), s/veh	2.2	22.0	0.0	42.0	19.8	0.0	16.4	3.2	0.0	0.4	31.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	9.8	0.0	11.6	13.7	0.0	3.6	10.2	0.0	2.0	19.0	0.0
LnGrp Delay(d),s/veh	41.8	58.8	0.0	78.5	52.1	0.0	39.5	30.4	0.0	21.3	62.1	0.0
LnGrp LOS	D	E		F	D		D	C		C	F	
Approach Vol, veh/h		867			1562			1040			1287	
Approach Delay, s/veh		54.3			63.2			31.9			58.3	
Approach LOS		D			E			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	35.3	14.0	30.0	10.8	35.5	22.0	22.0
Change Period (Y+Rc), s	5.0	6.0	5.5	* 5.5	5.0	6.0	5.0	5.5
Max Green Setting (Gmax), s	6.0	29.0	9.0	* 25	6.0	29.0	17.0	16.5
Max Q Clear Time (g_c+I1), s	7.7	31.3	7.9	25.1	6.1	22.6	19.0	18.5
Green Ext Time (p_c), s	0.0	0.0	0.6	0.0	0.0	6.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	53.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	10	375	0	5	5	95	150	5	10	415	160
Future Volume (veh/h)	115	10	375	0	5	5	95	150	5	10	415	160
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1814	1814	1850	1814	1850	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	125	11	0	0	5	5	103	163	5	11	451	0
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	372	14	198	0	107	107	654	1044	32	893	1082	920
Arrive On Green	0.13	0.13	0.00	0.00	0.13	0.13	0.60	0.60	0.60	0.60	0.60	0.00
Sat Flow, veh/h	1256	111	1542	0	833	833	936	1751	54	1212	1814	1542
Grp Volume(v), veh/h	136	0	0	0	0	10	103	0	168	11	451	0
Grp Sat Flow(s),veh/h/ln	1367	0	1542	0	0	1667	936	0	1804	1212	1814	1542
Q Serve(g_s), s	3.0	0.0	0.0	0.0	0.0	0.2	2.2	0.0	1.4	0.1	4.4	0.0
Cycle Q Clear(g_c), s	3.2	0.0	0.0	0.0	0.0	0.2	6.5	0.0	1.4	1.5	4.4	0.0
Prop In Lane	0.92		1.00	0.00		0.50	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	386	0	198	0	0	214	654	0	1076	893	1082	920
V/C Ratio(X)	0.35	0.00	0.00	0.00	0.00	0.05	0.16	0.00	0.16	0.01	0.42	0.00
Avail Cap(c_a), veh/h	923	0	778	0	0	841	654	0	1076	893	1082	920
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.9	0.0	0.0	0.0	0.0	12.5	5.3	0.0	2.9	3.3	3.5	0.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.0	0.0	0.1	0.5	0.0	0.3	0.0	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.0	0.0	0.0	0.1	0.6	0.0	0.7	0.0	2.5	0.0
LnGrp Delay(d),s/veh	14.4	0.0	0.0	0.0	0.0	12.6	5.8	0.0	3.2	3.3	4.7	0.0
LnGrp LOS	B					B	A		A	A	A	
Approach Vol, veh/h		136			10			271			462	
Approach Delay, s/veh		14.4			12.6			4.2			4.7	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		24.0		8.7		24.0		8.7
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		19.5		16.5		19.5		16.5
Max Q Clear Time (g_c+I1), s		8.5		5.2		6.4		2.2
Green Ext Time (p_c), s		3.4		0.5		3.7		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	6.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	51

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	55	70	90	125	55	90	45	465	25	65	70	10
Future Vol, veh/h	55	70	90	125	55	90	45	465	25	65	70	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	110	-	-	110	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	76	98	136	60	98	49	505	27	71	76	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	919	853	82	927	845	519	87	0	0	533	0	0
Stage 1	223	223	-	617	617	-	-	-	-	-	-	-
Stage 2	696	630	-	310	228	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	252	296	978	249	300	557	1509	-	-	1035	-	-
Stage 1	780	719	-	477	481	-	-	-	-	-	-	-
Stage 2	432	475	-	700	715	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	160	267	978	162	270	557	1509	-	-	1035	-	-
Mov Cap-2 Maneuver	160	267	-	162	270	-	-	-	-	-	-	-
Stage 1	755	670	-	462	465	-	-	-	-	-	-	-
Stage 2	300	460	-	520	666	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	45.7	180.3	0.6	3.9
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1509	-	-	308	237	1035	-	-
HCM Lane V/C Ratio	0.032	-	-	0.759	1.238	0.068	-	-
HCM Control Delay (s)	7.5	-	-	45.7	180.3	8.7	-	-
HCM Lane LOS	A	-	-	E	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	5.8	14.6	0.2	-	-

Intersection	
Int Delay, s/veh	4.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	80	160	35	65	40
Future Vol, veh/h	55	80	160	35	65	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	87	174	38	71	43

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	378	193	0	0	212	0
Stage 1	193	-	-	-	-	-
Stage 2	185	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	624	849	-	-	1358	-
Stage 1	840	-	-	-	-	-
Stage 2	847	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	590	849	-	-	1358	-
Mov Cap-2 Maneuver	590	-	-	-	-	-
Stage 1	840	-	-	-	-	-
Stage 2	801	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	4.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	720	1358	-
HCM Lane V/C Ratio	-	-	0.204	0.052	-
HCM Control Delay (s)	-	-	11.3	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-

Intersection	
Int Delay, s/veh	92.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	240	60	25	480	675	190
Future Vol, veh/h	240	60	25	480	675	190
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	261	65	27	522	734	207

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1413	837	940	0	-	0
Stage 1	837	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 152	367	729	-	-	-
Stage 1	425	-	-	-	-	-
Stage 2	562	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 144	367	729	-	-	-
Mov Cap-2 Maneuver	~ 144	-	-	-	-	-
Stage 1	425	-	-	-	-	-
Stage 2	533	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 512.2	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	729	-	164	-	-
HCM Lane V/C Ratio	0.037	-	1.988	-	-
HCM Control Delay (s)	10.1	0	$ 512.2	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	0.1	-	25.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Intersection Delay, s/veh	229.5
Intersection LOS	F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	255	225	700	170	150	385
Future Vol, veh/h	255	225	700	170	150	385
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	277	245	761	185	163	418
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	67	389.6	114.8
HCM LOS	F	F	F

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	53%	28%
Vol Thru, %	80%	0%	72%
Vol Right, %	20%	47%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	870	480	535
LT Vol	0	255	150
Through Vol	700	0	385
RT Vol	170	225	0
Lane Flow Rate	946	522	582
Geometry Grp	1	1	1
Degree of Util (X)	1.809	0.982	1.14
Departure Headway (Hd)	7.178	8.102	8.195
Convergence, Y/N	Yes	Yes	Yes
Cap	520	454	448
Service Time	5.178	6.102	6.195
HCM Lane V/C Ratio	1.819	1.15	1.299
HCM Control Delay	389.6	67	114.8
HCM Lane LOS	F	F	F
HCM 95th-tile Q	56.7	12.3	18.1

HCM 2010 Signalized Intersection Summary
9: Washington St & 32nd Ave

09/21/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	510	380	310	65	375	120	360	1005	70	120	1095	625
Future Volume (veh/h)	510	380	310	65	375	120	360	1005	70	120	1095	625
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1850	1832	1779	1832	1814	1814	1814	1779	1814	1832	1832
Adj Flow Rate, veh/h	654	437	0	144	441	0	474	1272	0	171	1244	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	1	1	2	1
Peak Hour Factor	0.78	0.87	0.96	0.45	0.85	0.75	0.76	0.79	0.75	0.70	0.88	0.97
Percent Heavy Veh, %	1	0	1	4	1	2	2	2	4	2	1	1
Cap, veh/h	587	542	456	165	397	334	793	1666	731	161	1160	519
Arrive On Green	0.17	0.29	0.00	0.10	0.22	0.00	0.24	0.48	0.00	0.09	0.33	0.00
Sat Flow, veh/h	3384	1850	1557	1694	1832	1542	3351	3446	1512	1727	3480	1557
Grp Volume(v), veh/h	654	437	0	144	441	0	474	1272	0	171	1244	0
Grp Sat Flow(s),veh/h/ln	1692	1850	1557	1694	1832	1542	1676	1723	1512	1727	1740	1557
Q Serve(g_s), s	26.0	32.8	0.0	12.6	32.5	0.0	18.9	45.3	0.0	14.0	50.0	0.0
Cycle Q Clear(g_c), s	26.0	32.8	0.0	12.6	32.5	0.0	18.9	45.3	0.0	14.0	50.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	587	542	456	165	397	334	793	1666	731	161	1160	519
V/C Ratio(X)	1.11	0.81	0.00	0.88	1.11	0.00	0.60	0.76	0.00	1.06	1.07	0.00
Avail Cap(c_a), veh/h	587	542	456	181	397	334	793	1666	731	161	1160	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.90	0.90	0.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	62.0	49.1	0.0	66.8	58.8	0.0	50.9	31.7	0.0	68.0	50.0	0.0
Incr Delay (d2), s/veh	72.8	9.9	0.0	31.0	78.8	0.0	0.8	3.1	0.0	82.0	46.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.1	18.2	0.0	7.3	25.1	0.0	8.8	22.3	0.0	10.3	31.5	0.0
LnGrp Delay(d),s/veh	134.8	59.0	0.0	97.8	137.6	0.0	51.7	34.8	0.0	150.0	96.2	0.0
LnGrp LOS	F	E		F	F		D	C		F	F	
Approach Vol, veh/h		1091			585			1746			1415	
Approach Delay, s/veh		104.4			127.8			39.4			102.7	
Approach LOS		F			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	41.5	56.0	19.6	50.4	19.0	78.5	31.0	39.0
Change Period (Y+Rc), s	5.5	* 6	5.0	6.5	5.0	5.5	5.0	6.5
Max Green Setting (Gmax), s	19.0	* 50	16.0	42.5	14.0	55.5	26.0	32.5
Max Q Clear Time (g_c+I1), s	20.9	52.0	14.6	34.8	16.0	47.3	28.0	34.5
Green Ext Time (p_c), s	0.0	0.0	0.0	4.1	0.0	7.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	83.3
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	665	70	90	725	45	140	180	55	55	245	65
Future Volume (veh/h)	85	665	70	90	725	45	140	180	55	55	245	65
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814
Adj Flow Rate, veh/h	92	723	76	98	788	49	152	196	60	60	266	71
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	973	827	286	973	827	318	544	462	372	544	462
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	654	1814	1542	678	1814	1542	1039	1814	1542	1119	1814	1542
Grp Volume(v), veh/h	92	723	76	98	788	49	152	196	60	60	266	71
Grp Sat Flow(s),veh/h/ln	654	1814	1542	678	1814	1542	1039	1814	1542	1119	1814	1542
Q Serve(g_s), s	7.4	16.9	1.3	7.2	19.6	0.8	7.7	4.7	1.6	2.4	6.6	1.9
Cycle Q Clear(g_c), s	27.0	16.9	1.3	24.1	19.6	0.8	14.3	4.7	1.6	7.1	6.6	1.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	973	827	286	973	827	318	544	463	372	544	463
V/C Ratio(X)	0.37	0.74	0.09	0.34	0.81	0.06	0.48	0.36	0.13	0.16	0.49	0.15
Avail Cap(c_a), veh/h	249	973	827	286	973	827	318	544	463	372	544	463
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.5	9.8	6.2	19.1	10.5	6.1	21.7	15.1	14.0	17.9	15.8	14.1
Incr Delay (d2), s/veh	4.2	5.1	0.2	3.2	7.3	0.1	5.1	1.9	0.6	0.9	3.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	9.6	0.6	1.6	11.6	0.4	2.6	2.6	0.7	0.8	3.7	0.9
LnGrp Delay(d),s/veh	25.7	15.0	6.4	22.4	17.7	6.2	26.8	17.0	14.6	18.8	18.9	14.8
LnGrp LOS	C	B	A	C	B	A	C	B	B	B	B	B
Approach Vol, veh/h		891			935			408			397	
Approach Delay, s/veh		15.3			17.6			20.3			18.2	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		21.0		34.0		21.0		34.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		16.5		29.5		16.5		29.5
Max Q Clear Time (g_c+I1), s		16.3		29.0		9.1		26.1
Green Ext Time (p_c), s		0.1		0.5		2.5		2.9

Intersection Summary	
HCM 2010 Ctrl Delay	17.3
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	235	205	145	190	145	85	1190	130	120	1345	210
Future Volume (veh/h)	210	235	205	145	190	145	85	1190	130	120	1345	210
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1832	1850	1850	1832	1832	1832	1832	1850	1850	1832	1850
Adj Flow Rate, veh/h	241	305	238	171	209	158	102	1266	188	176	1446	247
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.77	0.86	0.85	0.91	0.92	0.83	0.94	0.69	0.68	0.93	0.85
Percent Heavy Veh, %	2	1	0	0	1	1	1	1	0	0	1	0
Cap, veh/h	249	295	407	197	295	424	171	1463	765	196	1450	760
Arrive On Green	0.07	0.16	0.16	0.07	0.16	0.16	0.10	0.42	0.42	0.11	0.42	0.42
Sat Flow, veh/h	1727	1832	1570	1762	1832	1557	1744	3480	1571	1762	3480	1572
Grp Volume(v), veh/h	241	305	238	171	209	158	102	1266	188	176	1446	247
Grp Sat Flow(s),veh/h/ln	1727	1832	1570	1762	1832	1557	1744	1740	1571	1762	1740	1572
Q Serve(g_s), s	6.0	14.5	2.0	6.0	9.7	7.4	5.0	29.8	6.3	8.9	37.3	3.9
Cycle Q Clear(g_c), s	6.0	14.5	2.0	6.0	9.7	7.4	5.0	29.8	6.3	8.9	37.3	3.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	295	407	197	295	424	171	1463	765	196	1450	760
V/C Ratio(X)	0.97	1.03	0.58	0.87	0.71	0.37	0.60	0.87	0.25	0.90	1.00	0.32
Avail Cap(c_a), veh/h	249	295	407	197	295	424	174	1463	765	196	1450	760
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89	0.26	0.26	0.26
Uniform Delay (d), s/veh	36.1	37.8	13.5	33.0	35.7	26.5	38.9	23.8	13.5	39.5	26.2	4.5
Incr Delay (d2), s/veh	47.9	61.3	2.9	31.1	8.8	0.9	3.2	6.4	0.7	13.6	11.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	12.3	3.7	3.0	5.7	3.3	2.6	15.5	2.9	5.0	20.2	1.7
LnGrp Delay(d),s/veh	84.0	99.1	16.4	64.1	44.5	27.5	42.1	30.2	14.1	53.1	37.7	4.8
LnGrp LOS	F	F	B	E	D	C	D	C	B	D	D	A
Approach Vol, veh/h		784			538			1556			1869	
Approach Delay, s/veh		69.4			45.7			29.0			34.8	
Approach LOS		E			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.4	44.0	11.0	21.0	15.0	44.4	11.0	21.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 38	6.0	14.5	10.0	36.5	6.0	14.5
Max Q Clear Time (g_c+I1), s	7.0	39.3	8.0	16.5	10.9	31.8	8.0	11.7
Green Ext Time (p_c), s	1.2	0.0	0.0	0.0	0.0	4.1	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	39.9
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	185	15	95	145	70	100	1545	110	150	1450	265
Future Volume (veh/h)	170	185	15	95	145	70	100	1545	110	150	1450	265
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1850	1850	1850	1850	1850	1850	1850	1850	1832	1850	1850
Adj Flow Rate, veh/h	221	234	23	113	154	93	133	1736	141	234	1790	373
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.77	0.79	0.65	0.84	0.94	0.75	0.75	0.89	0.78	0.64	0.81	0.71
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	1	0	0
Cap, veh/h	241	227	719	191	224	391	590	2583	1267	222	1805	922
Arrive On Green	0.07	0.12	0.12	0.07	0.12	0.12	0.33	0.73	0.73	0.13	0.51	0.51
Sat Flow, veh/h	1762	1850	1572	1762	1850	1572	1762	3515	1572	1744	3515	1572
Grp Volume(v), veh/h	221	234	23	113	154	93	133	1736	141	234	1790	373
Grp Sat Flow(s),veh/h/ln	1762	1850	1572	1762	1850	1572	1762	1758	1572	1744	1758	1572
Q Serve(g_s), s	8.0	13.5	0.2	6.1	8.8	5.2	6.0	28.5	2.1	14.0	55.5	11.6
Cycle Q Clear(g_c), s	8.0	13.5	0.2	6.1	8.8	5.2	6.0	28.5	2.1	14.0	55.5	11.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	227	719	191	224	391	590	2583	1267	222	1805	922
V/C Ratio(X)	0.92	1.03	0.03	0.59	0.69	0.24	0.23	0.67	0.11	1.05	0.99	0.40
Avail Cap(c_a), veh/h	241	227	719	194	227	393	590	2583	1267	222	1805	922
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	0.85	0.85	0.85
Uniform Delay (d), s/veh	44.5	48.3	19.1	39.1	46.3	33.0	26.3	7.6	2.3	48.0	26.5	17.7
Incr Delay (d2), s/veh	35.5	67.9	0.0	5.1	9.8	0.5	0.1	1.3	0.2	70.7	17.6	1.1
Initial Q Delay(d3),s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	11.2	0.4	3.2	5.1	2.3	2.9	14.0	1.0	11.1	31.0	5.3
LnGrp Delay(d),s/veh	80.0	116.2	19.1	44.3	56.1	33.5	26.4	8.9	2.4	118.7	44.2	18.8
LnGrp LOS	E	F	B	D	E	C	C	A	A	F	D	B
Approach Vol, veh/h		478			360			2010			2397	
Approach Delay, s/veh		94.8			46.6			9.6			47.5	
Approach LOS		F			D			A			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	43.5	63.0	12.8	20.0	19.0	87.5	13.0	19.8
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 57	8.0	13.5	14.0	51.5	8.0	13.5
Max Q Clear Time (g_c+I1), s	10.0	57.5	8.1	15.5	16.0	30.5	10.0	10.8
Green Ext Time (p_c), s	0.1	0.0	0.0	0.0	0.0	18.5	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	37.2
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	420	190	30	45	90	65	870	50	365	925	75
Future Volume (veh/h)	85	420	190	30	45	90	65	870	50	365	925	75
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	92	457	207	33	49	98	71	946	54	397	1005	82
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	117	463	393	41	384	326	91	1031	59	406	1701	761
Arrive On Green	0.07	0.26	0.26	0.02	0.21	0.21	0.05	0.31	0.31	0.23	0.49	0.49
Sat Flow, veh/h	1727	1814	1542	1727	1814	1542	1727	3314	189	1727	3446	1542
Grp Volume(v), veh/h	92	457	207	33	49	98	71	492	508	397	1005	82
Grp Sat Flow(s),veh/h/ln	1727	1814	1542	1727	1814	1542	1727	1723	1780	1727	1723	1542
Q Serve(g_s), s	5.2	25.1	11.6	1.9	2.2	5.4	4.1	27.5	27.5	22.8	20.9	2.8
Cycle Q Clear(g_c), s	5.2	25.1	11.6	1.9	2.2	5.4	4.1	27.5	27.5	22.8	20.9	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	117	463	393	41	384	326	91	536	554	406	1701	761
V/C Ratio(X)	0.79	0.99	0.53	0.80	0.13	0.30	0.78	0.92	0.92	0.98	0.59	0.11
Avail Cap(c_a), veh/h	207	463	393	71	384	326	168	536	554	406	1701	761
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	45.9	37.1	32.1	48.6	31.9	33.2	46.8	33.2	33.2	38.0	18.1	13.5
Incr Delay (d2), s/veh	11.2	38.6	1.3	28.0	0.1	0.5	13.6	23.1	22.6	36.6	1.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	17.5	5.1	1.2	1.1	2.3	2.3	16.6	17.0	15.0	10.2	1.3
LnGrp Delay(d),s/veh	57.1	75.7	33.4	76.6	32.1	33.7	60.4	56.3	55.8	74.6	19.5	13.8
LnGrp LOS	E	E	C	E	C	C	E	E	E	E	B	B
Approach Vol, veh/h		756			180			1071			1484	
Approach Delay, s/veh		61.9			41.1			56.3			33.9	
Approach LOS		E			D			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	28.0	35.1	6.9	30.0	9.7	53.4	11.2	25.7
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.0	4.5	4.5
Max Green Setting (Gmax), s	23.5	29.4	4.1	25.5	9.7	43.2	12.0	17.6
Max Q Clear Time (g_c+I1), s	24.8	29.5	3.9	27.1	6.1	22.9	7.2	7.4
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	13.8	0.1	3.0

Intersection Summary	
HCM 2010 Ctrl Delay	47.2
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	18.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	225	35	115	140	5	25	180	105	5	260	40
Future Vol, veh/h	35	225	35	115	140	5	25	180	105	5	260	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	245	38	125	152	5	27	196	114	5	283	43
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	18.9	14.1	20.3	20.6
HCM LOS	C	B	C	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	100%	0%	100%	0%	2%
Vol Thru, %	58%	0%	87%	0%	97%	85%
Vol Right, %	34%	0%	13%	0%	3%	13%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	310	35	260	115	145	305
LT Vol	25	35	0	115	0	5
Through Vol	180	0	225	0	140	260
RT Vol	105	0	35	0	5	40
Lane Flow Rate	337	38	283	125	158	332
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.624	0.084	0.579	0.282	0.331	0.624
Departure Headway (Hd)	6.664	7.983	7.371	8.11	7.569	6.776
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	539	446	486	440	471	530
Service Time	4.751	5.775	5.162	5.909	5.368	4.865
HCM Lane V/C Ratio	0.625	0.085	0.582	0.284	0.335	0.626
HCM Control Delay	20.3	11.5	19.9	14.1	14.1	20.6
HCM Lane LOS	C	B	C	B	B	C
HCM 95th-tile Q	4.3	0.3	3.6	1.1	1.4	4.2

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	40	30	305	440	95
Future Vol, veh/h	65	40	30	305	440	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	43	33	332	478	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	927	530	582	0	-	0
Stage 1	530	-	-	-	-	-
Stage 2	397	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	298	549	992	-	-	-
Stage 1	590	-	-	-	-	-
Stage 2	679	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	286	549	992	-	-	-
Mov Cap-2 Maneuver	286	-	-	-	-	-
Stage 1	590	-	-	-	-	-
Stage 2	651	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.2	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	992	-	350	-	-
HCM Lane V/C Ratio	0.033	-	0.326	-	-
HCM Control Delay (s)	8.8	0	20.2	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.4	-	-

Intersection	
Intersection Delay, s/veh	301.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	355	205	145	120	205	85	80	200	75	50	280	210
Future Vol, veh/h	355	205	145	120	205	85	80	200	75	50	280	210
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	386	223	158	130	223	92	87	217	82	54	304	228
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	498.9	153	107.9	283.5
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	23%	50%	29%	9%
Vol Thru, %	56%	29%	50%	52%
Vol Right, %	21%	21%	21%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	355	705	410	540
LT Vol	80	355	120	50
Through Vol	200	205	205	280
RT Vol	75	145	85	210
Lane Flow Rate	386	766	446	587
Geometry Grp	1	1	1	1
Degree of Util (X)	1.024	2.026	1.173	1.521
Departure Headway (Hd)	15.321	11.851	14.731	12.945
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	239	314	250	288
Service Time	13.321	9.851	12.731	10.945
HCM Lane V/C Ratio	1.615	2.439	1.784	2.038
HCM Control Delay	107.9	498.9	153	283.5
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	9.9	44.2	13.3	24.6

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	85	30	185	10	10	5	90	170	10	15	215	140
Future Vol, veh/h	85	30	185	10	10	5	90	170	10	15	215	140
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	92	33	201	11	11	5	98	185	11	16	234	152

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	736	733	310	845	804	190	386	0	0	196	0	0
Stage 1	342	342	-	386	386	-	-	-	-	-	-	-
Stage 2	394	391	-	459	418	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	335	348	730	283	316	852	1172	-	-	1377	-	-
Stage 1	673	638	-	637	610	-	-	-	-	-	-	-
Stage 2	631	607	-	582	591	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	297	311	730	173	282	852	1172	-	-	1377	-	-
Mov Cap-2 Maneuver	297	311	-	173	282	-	-	-	-	-	-	-
Stage 1	610	628	-	577	553	-	-	-	-	-	-	-
Stage 2	557	550	-	394	582	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.7	21	2.8	0.3
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1172	-	-	297	614	252	1377	-	-
HCM Lane V/C Ratio	0.083	-	-	0.311	0.381	0.108	0.012	-	-
HCM Control Delay (s)	8.4	0	-	22.5	14.4	21	7.6	0	-
HCM Lane LOS	A	A	-	C	B	C	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	1.3	1.8	0.4	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	240	625	335	625	745	130	140	875	460	120	1175	235
Future Volume (veh/h)	240	625	335	625	745	130	140	875	460	120	1175	235
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1832	1850	1832	1832	1832	1832	1814	1814	1832	1832	1832
Adj Flow Rate, veh/h	255	718	0	718	993	0	177	951	0	140	1291	0
Adj No. of Lanes	2	2	1	2	2	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.87	0.69	0.87	0.75	0.44	0.79	0.92	0.87	0.86	0.91	0.81
Percent Heavy Veh, %	1	1	0	1	1	1	1	2	2	1	1	1
Cap, veh/h	325	740	334	677	1087	486	147	1235	552	207	1247	558
Arrive On Green	0.16	0.35	0.00	0.20	0.31	0.00	0.03	0.24	0.00	0.03	0.24	0.00
Sat Flow, veh/h	3384	3480	1572	3384	3480	1557	1744	3446	1542	1744	3480	1557
Grp Volume(v), veh/h	255	718	0	718	993	0	177	951	0	140	1291	0
Grp Sat Flow(s),veh/h/ln	1692	1740	1572	1692	1740	1557	1744	1723	1542	1744	1740	1557
Q Serve(g_s), s	8.7	24.4	0.0	24.0	32.9	0.0	6.0	30.9	0.0	6.0	43.0	0.0
Cycle Q Clear(g_c), s	8.7	24.4	0.0	24.0	32.9	0.0	6.0	30.9	0.0	6.0	43.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	325	740	334	677	1087	486	147	1235	552	207	1247	558
V/C Ratio(X)	0.79	0.97	0.00	1.06	0.91	0.00	1.20	0.77	0.00	0.68	1.04	0.00
Avail Cap(c_a), veh/h	325	740	334	677	1117	500	147	1235	552	207	1247	558
HCM Platoon Ratio	1.67	1.67	1.67	1.00	1.00	1.00	0.67	0.67	0.67	0.67	0.67	0.67
Upstream Filter(I)	0.39	0.39	0.00	1.00	1.00	0.00	0.59	0.59	0.00	0.85	0.85	0.00
Uniform Delay (d), s/veh	49.2	38.3	0.0	48.0	39.7	0.0	33.0	41.0	0.0	29.0	45.6	0.0
Incr Delay (d2), s/veh	4.5	14.4	0.0	51.8	11.6	0.0	122.9	2.8	0.0	5.9	33.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	13.1	0.0	16.1	17.6	0.0	7.0	15.2	0.0	2.0	26.4	0.0
LnGrp Delay(d),s/veh	53.7	52.8	0.0	99.8	51.3	0.0	155.9	43.8	0.0	35.0	78.7	0.0
LnGrp LOS	D	D		F	D		F	D		C	F	
Approach Vol, veh/h		973			1711			1128			1431	
Approach Delay, s/veh		53.0			71.7			61.4			74.4	
Approach LOS		D			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	49.0	17.0	43.0	11.0	49.0	29.0	31.0
Change Period (Y+Rc), s	5.0	6.0	5.5	* 5.5	5.0	6.0	5.0	5.5
Max Green Setting (Gmax), s	6.0	43.0	11.0	* 39	6.0	43.0	24.0	25.5
Max Q Clear Time (g_c+I1), s	8.0	45.0	10.7	34.9	8.0	32.9	26.0	26.4
Green Ext Time (p_c), s	0.0	0.0	0.2	2.5	0.0	9.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	66.7
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	10	420	0	5	5	100	165	5	10	450	170
Future Volume (veh/h)	125	10	420	0	5	5	100	165	5	10	450	170
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1814	1814	1850	1814	1850	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	136	11	0	0	5	5	109	179	5	11	489	0
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	360	14	215	0	116	116	627	1093	31	883	1128	959
Arrive On Green	0.14	0.14	0.00	0.00	0.14	0.14	0.62	0.62	0.62	0.62	0.62	0.00
Sat Flow, veh/h	1268	103	1542	0	833	833	904	1756	49	1195	1814	1542
Grp Volume(v), veh/h	147	0	0	0	0	10	109	0	184	11	489	0
Grp Sat Flow(s),veh/h/ln	1370	0	1542	0	0	1667	904	0	1805	1195	1814	1542
Q Serve(g_s), s	3.8	0.0	0.0	0.0	0.0	0.2	2.7	0.0	1.6	0.1	5.3	0.0
Cycle Q Clear(g_c), s	4.0	0.0	0.0	0.0	0.0	0.2	7.9	0.0	1.6	1.8	5.3	0.0
Prop In Lane	0.93		1.00	0.00		0.50	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	375	0	215	0	0	233	627	0	1123	883	1128	959
V/C Ratio(X)	0.39	0.00	0.00	0.00	0.00	0.04	0.17	0.00	0.16	0.01	0.43	0.00
Avail Cap(c_a), veh/h	836	0	714	0	0	772	627	0	1123	883	1128	959
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	15.8	0.0	0.0	0.0	0.0	14.1	5.7	0.0	3.0	3.4	3.7	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.0	0.0	0.1	0.6	0.0	0.3	0.0	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.9	0.1	3.0	0.0
LnGrp Delay(d),s/veh	16.5	0.0	0.0	0.0	0.0	14.1	6.4	0.0	3.3	3.4	4.9	0.0
LnGrp LOS	B					B	A		A	A	A	
Approach Vol, veh/h		147			10			293			500	
Approach Delay, s/veh		16.5			14.1			4.4			4.9	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		28.0		9.8		28.0		9.8
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		23.5		17.5		23.5		17.5
Max Q Clear Time (g_c+I1), s		9.9		6.0		7.3		2.2
Green Ext Time (p_c), s		4.2		0.6		4.5		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	6.6
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	11.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	15	65	125	55	90	25	240	15	65	70	10
Future Vol, veh/h	25	15	65	125	55	90	25	240	15	65	70	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	110	-	-	110	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	16	71	136	60	98	27	261	16	71	76	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	625	555	82	589	551	269	87	0	0	277	0	0
Stage 1	223	223	-	323	323	-	-	-	-	-	-	-
Stage 2	402	332	-	266	228	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	397	440	978	420	442	770	1509	-	-	1286	-	-
Stage 1	780	719	-	689	650	-	-	-	-	-	-	-
Stage 2	625	644	-	739	715	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	291	408	978	357	410	770	1509	-	-	1286	-	-
Mov Cap-2 Maneuver	291	408	-	357	410	-	-	-	-	-	-	-
Stage 1	766	679	-	677	638	-	-	-	-	-	-	-
Stage 2	486	632	-	632	676	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.2	26.9	0.7	3.6
HCM LOS	B	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1509	-	-	555	449	1286	-	-
HCM Lane V/C Ratio	0.018	-	-	0.206	0.654	0.055	-	-
HCM Control Delay (s)	7.4	-	-	13.2	26.9	8	-	-
HCM Lane LOS	A	-	-	B	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.8	4.6	0.2	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	50	105	25	70	45
Future Vol, veh/h	30	50	105	25	70	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	54	114	27	76	49

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	329	128	0	0	141	0
Stage 1	128	-	-	-	-	-
Stage 2	201	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	665	922	-	-	1442	-
Stage 1	898	-	-	-	-	-
Stage 2	833	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	629	922	-	-	1442	-
Mov Cap-2 Maneuver	629	-	-	-	-	-
Stage 1	898	-	-	-	-	-
Stage 2	788	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	4.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	785	1442	-
HCM Lane V/C Ratio	-	-	0.111	0.053	-
HCM Control Delay (s)	-	-	10.2	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.2	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	85	20	20	375	355	100
Future Vol, veh/h	85	20	20	375	355	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	92	22	22	408	386	109

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	891	440	495	0	-	0
Stage 1	440	-	-	-	-	-
Stage 2	451	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	313	617	1069	-	-	-
Stage 1	649	-	-	-	-	-
Stage 2	642	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	305	617	1069	-	-	-
Mov Cap-2 Maneuver	305	-	-	-	-	-
Stage 1	649	-	-	-	-	-
Stage 2	625	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1069	-	338	-	-
HCM Lane V/C Ratio	0.02	-	0.338	-	-
HCM Control Delay (s)	8.4	0	21	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.5	-	-

Intersection	
Intersection Delay, s/veh	14
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	10	445	15	15	410
Future Vol, veh/h	15	10	445	15	15	410
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	484	16	16	446
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.2	14.6	13.7
HCM LOS	A	B	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	60%	4%
Vol Thru, %	97%	0%	96%
Vol Right, %	3%	40%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	460	25	425
LT Vol	0	15	15
Through Vol	445	0	410
RT Vol	15	10	0
Lane Flow Rate	500	27	462
Geometry Grp	1	1	1
Degree of Util (X)	0.621	0.044	0.581
Departure Headway (Hd)	4.469	5.845	4.528
Convergence, Y/N	Yes	Yes	Yes
Cap	810	609	799
Service Time	2.496	3.913	2.557
HCM Lane V/C Ratio	0.617	0.044	0.578
HCM Control Delay	14.6	9.2	13.7
HCM Lane LOS	B	A	B
HCM 95th-tile Q	4.4	0.1	3.8

HCM 2010 Signalized Intersection Summary
9: Washington St & 32nd Ave

09/21/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	475	355	285	40	240	75	375	1050	70	120	1085	620
Future Volume (veh/h)	475	355	285	40	240	75	375	1050	70	120	1085	620
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1850	1832	1779	1832	1814	1814	1814	1779	1814	1832	1832
Adj Flow Rate, veh/h	609	408	0	89	282	0	493	1329	0	171	1233	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	1	1	2	1
Peak Hour Factor	0.78	0.87	0.96	0.45	0.85	0.75	0.76	0.79	0.75	0.70	0.88	0.97
Percent Heavy Veh, %	1	0	1	4	1	2	2	2	4	2	1	1
Cap, veh/h	592	489	411	110	282	238	936	1824	800	173	1189	532
Arrive On Green	0.06	0.09	0.00	0.07	0.15	0.00	0.28	0.53	0.00	0.03	0.11	0.00
Sat Flow, veh/h	3384	1850	1557	1694	1832	1542	3351	3446	1512	1727	3480	1557
Grp Volume(v), veh/h	609	408	0	89	282	0	493	1329	0	171	1233	0
Grp Sat Flow(s),veh/h/ln	1692	1850	1557	1694	1832	1542	1676	1723	1512	1727	1740	1557
Q Serve(g_s), s	21.0	26.1	0.0	6.2	18.5	0.0	14.9	35.5	0.0	11.9	41.0	0.0
Cycle Q Clear(g_c), s	21.0	26.1	0.0	6.2	18.5	0.0	14.9	35.5	0.0	11.9	41.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	592	489	411	110	282	238	936	1824	800	173	1189	532
V/C Ratio(X)	1.03	0.83	0.00	0.81	1.00	0.00	0.53	0.73	0.00	0.99	1.04	0.00
Avail Cap(c_a), veh/h	592	489	411	127	282	238	936	1824	800	173	1189	532
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.90	0.90	0.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	56.5	52.2	0.0	55.4	50.7	0.0	36.6	21.7	0.0	58.0	53.2	0.0
Incr Delay (d2), s/veh	44.4	13.0	0.0	24.1	53.2	0.0	0.3	2.3	0.0	59.7	34.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.5	15.2	0.0	3.7	13.5	0.0	6.9	17.4	0.0	8.6	25.4	0.0
LnGrp Delay(d),s/veh	100.9	65.2	0.0	79.5	103.9	0.0	36.8	24.0	0.0	117.7	87.3	0.0
LnGrp LOS	F	E		E	F		D	C		F	F	
Approach Vol, veh/h		1017			371			1822			1404	
Approach Delay, s/veh		86.6			98.0			27.5			91.0	
Approach LOS		F			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.4	47.0	12.8	38.2	17.0	69.4	26.0	25.0
Change Period (Y+Rc), s	5.5	* 6	5.0	6.5	5.0	5.5	5.0	6.5
Max Green Setting (Gmax), s	17.0	* 41	9.0	30.5	12.0	46.5	21.0	18.5
Max Q Clear Time (g_c+I1), s	16.9	43.0	8.2	28.1	13.9	37.5	23.0	20.5
Green Ext Time (p_c), s	0.0	0.0	0.0	1.2	0.0	8.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	65.5
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	675	70	90	735	45	145	180	55	55	240	65
Future Volume (veh/h)	85	675	70	90	735	45	145	180	55	55	240	65
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814
Adj Flow Rate, veh/h	92	734	76	98	799	49	158	196	60	60	261	71
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	242	973	827	279	973	827	321	544	462	372	544	462
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	647	1814	1542	671	1814	1542	1044	1814	1542	1119	1814	1542
Grp Volume(v), veh/h	92	734	76	98	799	49	158	196	60	60	261	71
Grp Sat Flow(s),veh/h/ln	647	1814	1542	671	1814	1542	1044	1814	1542	1119	1814	1542
Q Serve(g_s), s	7.6	17.3	1.3	7.3	20.1	0.8	8.0	4.7	1.6	2.4	6.5	1.9
Cycle Q Clear(g_c), s	27.6	17.3	1.3	24.7	20.1	0.8	14.5	4.7	1.6	7.1	6.5	1.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	242	973	827	279	973	827	321	544	463	372	544	463
V/C Ratio(X)	0.38	0.75	0.09	0.35	0.82	0.06	0.49	0.36	0.13	0.16	0.48	0.15
Avail Cap(c_a), veh/h	242	973	827	279	973	827	321	544	463	372	544	463
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.0	9.9	6.2	19.5	10.6	6.1	21.7	15.1	14.0	17.9	15.7	14.1
Incr Delay (d2), s/veh	4.5	5.4	0.2	3.4	7.8	0.1	5.3	1.9	0.6	0.9	3.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	10.0	0.6	1.6	11.9	0.4	2.8	2.6	0.7	0.8	3.6	0.9
LnGrp Delay(d),s/veh	26.5	15.4	6.4	23.0	18.3	6.2	27.0	17.0	14.6	18.8	18.8	14.8
LnGrp LOS	C	B	A	C	B	A	C	B	B	B	B	B
Approach Vol, veh/h		902			946			414			392	
Approach Delay, s/veh		15.7			18.2			20.4			18.1	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		21.0		34.0		21.0		34.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		16.5		29.5		16.5		29.5
Max Q Clear Time (g_c+I1), s		16.5		29.6		9.1		26.7
Green Ext Time (p_c), s		0.0		0.0		2.5		2.5

Intersection Summary	
HCM 2010 Ctrl Delay	17.7
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	230	200	140	185	145	85	1195	130	120	1360	210
Future Volume (veh/h)	205	230	200	140	185	145	85	1195	130	120	1360	210
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1832	1850	1850	1832	1832	1832	1832	1850	1850	1832	1850
Adj Flow Rate, veh/h	236	299	233	165	203	158	102	1271	188	176	1462	247
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.77	0.86	0.85	0.91	0.92	0.83	0.94	0.69	0.68	0.93	0.85
Percent Heavy Veh, %	2	1	0	0	1	1	1	1	0	0	1	0
Cap, veh/h	253	295	407	197	295	424	171	1463	765	196	1450	760
Arrive On Green	0.07	0.16	0.16	0.07	0.16	0.16	0.10	0.42	0.42	0.11	0.42	0.42
Sat Flow, veh/h	1727	1832	1570	1762	1832	1557	1744	3480	1571	1762	3480	1572
Grp Volume(v), veh/h	236	299	233	165	203	158	102	1271	188	176	1462	247
Grp Sat Flow(s),veh/h/ln	1727	1832	1570	1762	1832	1557	1744	1740	1571	1762	1740	1572
Q Serve(g_s), s	6.0	14.5	1.9	6.0	9.4	7.4	5.0	30.0	6.3	8.9	37.5	3.9
Cycle Q Clear(g_c), s	6.0	14.5	1.9	6.0	9.4	7.4	5.0	30.0	6.3	8.9	37.5	3.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	253	295	407	197	295	424	171	1463	765	196	1450	760
V/C Ratio(X)	0.93	1.01	0.57	0.84	0.69	0.37	0.60	0.87	0.25	0.90	1.01	0.32
Avail Cap(c_a), veh/h	253	295	407	197	295	424	174	1463	765	196	1450	760
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89	0.26	0.26	0.26
Uniform Delay (d), s/veh	35.8	37.8	13.4	32.5	35.6	26.5	38.9	23.8	13.5	39.5	26.3	4.5
Incr Delay (d2), s/veh	38.6	55.8	2.7	26.0	7.7	0.9	3.2	6.6	0.7	13.6	14.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	11.9	3.5	2.6	5.4	3.3	2.6	15.6	2.9	5.0	20.8	1.7
LnGrp Delay(d),s/veh	74.4	93.6	16.1	58.5	43.4	27.5	42.1	30.4	14.1	53.1	40.5	4.8
LnGrp LOS	E	F	B	E	D	C	D	C	B	D	F	A
Approach Vol, veh/h		768			526			1561			1885	
Approach Delay, s/veh		64.2			43.3			29.2			37.0	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.4	44.0	11.0	21.0	15.0	44.4	11.0	21.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 38	6.0	14.5	10.0	36.5	6.0	14.5
Max Q Clear Time (g_c+I1), s	7.0	39.5	8.0	16.5	10.9	32.0	8.0	11.4
Green Ext Time (p_c), s	1.2	0.0	0.0	0.0	0.0	4.0	0.0	1.9

Intersection Summary	
HCM 2010 Ctrl Delay	39.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	195	15	90	140	65	100	1525	110	150	1455	265
Future Volume (veh/h)	180	195	15	90	140	65	100	1525	110	150	1455	265
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1850	1850	1850	1850	1850	1850	1850	1850	1832	1850	1850
Adj Flow Rate, veh/h	234	247	23	107	149	87	133	1713	141	234	1796	373
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.77	0.79	0.65	0.84	0.94	0.75	0.75	0.89	0.78	0.64	0.81	0.71
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	1	0	0
Cap, veh/h	239	239	516	177	239	413	351	2136	1060	233	1860	937
Arrive On Green	0.07	0.13	0.13	0.07	0.13	0.13	0.40	1.00	1.00	0.04	0.17	0.17
Sat Flow, veh/h	1762	1850	1572	1762	1850	1572	1762	3515	1572	1744	3515	1572
Grp Volume(v), veh/h	234	247	23	107	149	87	133	1713	141	234	1796	373
Grp Sat Flow(s),veh/h/ln	1762	1850	1572	1762	1850	1572	1762	1758	1572	1744	1758	1572
Q Serve(g_s), s	8.0	15.5	0.2	6.2	9.2	5.2	6.4	0.0	0.0	16.0	60.9	18.6
Cycle Q Clear(g_c), s	8.0	15.5	0.2	6.2	9.2	5.2	6.4	0.0	0.0	16.0	60.9	18.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	239	516	177	239	413	351	2136	1060	233	1860	937
V/C Ratio(X)	0.98	1.03	0.04	0.60	0.62	0.21	0.38	0.80	0.13	1.01	0.97	0.40
Avail Cap(c_a), veh/h	239	239	516	177	239	413	351	2136	1060	233	1860	937
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	0.85	0.85	0.85
Uniform Delay (d), s/veh	49.4	52.2	21.4	42.3	49.5	34.5	30.8	0.0	0.0	57.4	48.4	24.9
Incr Delay (d2), s/veh	52.1	67.2	0.1	6.2	6.3	0.4	0.2	3.0	0.2	56.0	12.7	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	12.4	0.5	3.3	5.1	2.3	3.1	0.9	0.1	11.4	33.0	8.4
LnGrp Delay(d),s/veh	101.4	119.5	21.5	48.5	55.8	35.0	31.1	3.0	0.2	113.4	61.2	26.0
LnGrp LOS	F	F	C	D	E	C	C	A	A	F	E	C
Approach Vol, veh/h		504			343			1987			2403	
Approach Delay, s/veh		106.7			48.2			4.7			60.8	
Approach LOS		F			D			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	30.5	70.0	13.0	22.0	21.0	79.5	13.0	22.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	10.0	* 64	8.0	15.5	16.0	57.5	8.0	15.5
Max Q Clear Time (g_c+I1), s	10.4	62.9	8.2	17.5	18.0	2.0	10.0	11.2
Green Ext Time (p_c), s	0.3	0.6	0.0	0.0	0.0	41.2	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	43.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	430	195	55	80	165	65	895	55	390	990	80
Future Volume (veh/h)	85	430	195	55	80	165	65	895	55	390	990	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	92	467	212	60	87	179	71	973	60	424	1076	87
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	115	467	397	73	423	360	151	1017	63	425	1608	719
Arrive On Green	0.07	0.26	0.26	0.04	0.23	0.23	0.09	0.31	0.31	0.25	0.47	0.47
Sat Flow, veh/h	1727	1814	1542	1727	1814	1542	1727	3298	203	1727	3446	1542
Grp Volume(v), veh/h	92	467	212	60	87	179	71	508	525	424	1076	87
Grp Sat Flow(s),veh/h/ln	1727	1814	1542	1727	1814	1542	1727	1723	1778	1727	1723	1542
Q Serve(g_s), s	6.3	30.9	11.1	4.1	4.6	7.0	4.7	34.7	34.7	29.4	29.1	2.8
Cycle Q Clear(g_c), s	6.3	30.9	11.1	4.1	4.6	7.0	4.7	34.7	34.7	29.4	29.1	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	115	467	397	73	423	360	151	531	548	425	1608	719
V/C Ratio(X)	0.80	1.00	0.53	0.82	0.21	0.50	0.47	0.96	0.96	1.00	0.67	0.12
Avail Cap(c_a), veh/h	189	467	397	73	423	360	151	531	548	425	1608	719
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	55.2	44.5	23.4	57.0	37.0	13.5	52.1	40.7	40.7	45.2	24.8	10.0
Incr Delay (d2), s/veh	12.0	41.6	1.4	49.0	0.2	1.1	2.3	29.7	29.2	41.1	2.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	20.8	4.8	3.0	2.3	3.1	2.3	20.9	21.5	18.9	14.2	1.3
LnGrp Delay(d),s/veh	67.2	86.2	24.8	106.0	37.3	14.5	54.4	70.4	69.9	86.3	26.8	10.3
LnGrp LOS	E	F	C	F	D	B	D	E	E	F	C	B
Approach Vol, veh/h		771			326			1104			1587	
Approach Delay, s/veh		67.0			37.4			69.1			41.8	
Approach LOS		E			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	34.0	41.0	9.6	35.4	15.0	60.0	12.5	32.5
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.0	4.5	4.5
Max Green Setting (Gmax), s	29.5	37.0	5.1	30.9	10.5	56.0	13.1	22.9
Max Q Clear Time (g_c+I1), s	31.4	36.7	6.1	32.9	6.7	31.1	8.3	9.0
Green Ext Time (p_c), s	0.0	0.2	0.0	0.0	0.6	9.1	0.1	3.9

Intersection Summary	
HCM 2010 Ctrl Delay	54.5
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	23.4
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	270	45	140	170	5	25	175	100	5	255	40
Future Vol, veh/h	40	270	45	140	170	5	25	175	100	5	255	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	293	49	152	185	5	27	190	109	5	277	43
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	27.6	16.5	24.1	24.8
HCM LOS	D	C	C	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	100%	0%	100%	0%	2%
Vol Thru, %	58%	0%	86%	0%	97%	85%
Vol Right, %	33%	0%	14%	0%	3%	13%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	300	40	315	140	175	300
LT Vol	25	40	0	140	0	5
Through Vol	175	0	270	0	170	255
RT Vol	100	0	45	0	5	40
Lane Flow Rate	326	43	342	152	190	326
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.667	0.101	0.739	0.363	0.425	0.676
Departure Headway (Hd)	7.368	8.396	7.775	8.584	8.045	7.461
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	489	426	466	418	447	483
Service Time	5.433	6.158	5.536	6.354	5.814	5.526
HCM Lane V/C Ratio	0.667	0.101	0.734	0.364	0.425	0.675
HCM Control Delay	24.1	12.1	29.6	16.2	16.7	24.8
HCM Lane LOS	C	B	D	C	C	C
HCM 95th-tile Q	4.8	0.3	6.1	1.6	2.1	5

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	40	30	295	435	90
Future Vol, veh/h	65	40	30	295	435	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	43	33	321	473	98

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	908	522	571	0	-	0
Stage 1	522	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	306	555	1002	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	294	555	1002	-	-	-
Mov Cap-2 Maneuver	294	-	-	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	660	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.7	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1002	-	358	-	-
HCM Lane V/C Ratio	0.033	-	0.319	-	-
HCM Control Delay (s)	8.7	0	19.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.3	-	-

Intersection	
Intersection Delay, s/veh	24.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	205	50	65	5	15	5	65	215	10	10	300	195
Future Vol, veh/h	205	50	65	5	15	5	65	215	10	10	300	195
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	223	54	71	5	16	5	71	234	11	11	326	212
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	19.6	10.9	16.5	33
HCM LOS	C	B	C	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	22%	64%	20%	2%
Vol Thru, %	74%	16%	60%	59%
Vol Right, %	3%	20%	20%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	290	320	25	505
LT Vol	65	205	5	10
Through Vol	215	50	15	300
RT Vol	10	65	5	195
Lane Flow Rate	315	348	27	549
Geometry Grp	1	1	1	1
Degree of Util (X)	0.544	0.623	0.056	0.856
Departure Headway (Hd)	6.21	6.443	7.373	5.616
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	580	560	483	648
Service Time	4.262	4.47	5.452	3.642
HCM Lane V/C Ratio	0.543	0.621	0.056	0.847
HCM Control Delay	16.5	19.6	10.9	33
HCM Lane LOS	C	C	B	D
HCM 95th-tile Q	3.3	4.3	0.2	9.7

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	240	220	395	150	220	150	85	160	100	100	165	110
Future Vol, veh/h	240	220	395	150	220	150	85	160	100	100	165	110
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	261	239	429	163	239	163	92	174	109	109	179	120

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1071	924	239	1204	929	228	299	0	0	283	0	0
Stage 1	457	457	-	413	413	-	-	-	-	-	-	-
Stage 2	614	467	-	791	516	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 198	269	800	~ 161	268	811	1262	-	-	1279	-	-
Stage 1	583	568	-	616	594	-	-	-	-	-	-	-
Stage 2	479	562	-	383	534	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 220	800	-	~ 219	811	1262	-	-	1279	-	-
Mov Cap-2 Maneuver	-	~ 220	-	-	~ 219	-	-	-	-	-	-	-
Stage 1	532	509	-	562	542	-	-	-	-	-	-	-
Stage 2	~ 195	513	-	~ 84	478	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			2	2.2
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1262	-	-	-	412	-	1279	-	-
HCM Lane V/C Ratio	0.073	-	-	-	1.623	-	0.085	-	-
HCM Control Delay (s)	8.1	0	-	-	$ 315	-	8.1	0	-
HCM Lane LOS	A	A	-	-	F	-	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	-	38.6	-	0.3	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	245	640	345	650	775	130	140	880	465	120	1170	235
Future Volume (veh/h)	245	640	345	650	775	130	140	880	465	120	1170	235
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1832	1850	1832	1832	1832	1832	1814	1814	1832	1832	1832
Adj Flow Rate, veh/h	261	736	0	747	1033	0	177	957	0	140	1286	0
Adj No. of Lanes	2	2	1	2	2	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.87	0.69	0.87	0.75	0.44	0.79	0.92	0.87	0.86	0.91	0.81
Percent Heavy Veh, %	1	1	0	1	1	1	1	2	2	1	1	1
Cap, veh/h	331	769	347	705	1139	509	147	1177	527	194	1189	532
Arrive On Green	0.16	0.37	0.00	0.21	0.33	0.00	0.03	0.23	0.00	0.03	0.23	0.00
Sat Flow, veh/h	3384	3480	1572	3384	3480	1557	1744	3446	1542	1744	3480	1557
Grp Volume(v), veh/h	261	736	0	747	1033	0	177	957	0	140	1286	0
Grp Sat Flow(s),veh/h/ln	1692	1740	1572	1692	1740	1557	1744	1723	1542	1744	1740	1557
Q Serve(g_s), s	8.9	24.8	0.0	25.0	34.1	0.0	6.0	31.6	0.0	6.0	41.0	0.0
Cycle Q Clear(g_c), s	8.9	24.8	0.0	25.0	34.1	0.0	6.0	31.6	0.0	6.0	41.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	331	769	347	705	1139	509	147	1177	527	194	1189	532
V/C Ratio(X)	0.79	0.96	0.00	1.06	0.91	0.00	1.20	0.81	0.00	0.72	1.08	0.00
Avail Cap(c_a), veh/h	331	769	347	705	1175	525	147	1177	527	194	1189	532
HCM Platoon Ratio	1.67	1.67	1.67	1.00	1.00	1.00	0.67	0.67	0.67	0.67	0.67	0.67
Upstream Filter(I)	0.39	0.39	0.00	1.00	1.00	0.00	0.59	0.59	0.00	0.85	0.85	0.00
Uniform Delay (d), s/veh	49.0	37.3	0.0	47.5	38.6	0.0	34.2	42.6	0.0	31.3	46.3	0.0
Incr Delay (d2), s/veh	4.6	12.0	0.0	50.8	10.5	0.0	122.9	3.8	0.0	9.4	49.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	13.0	0.0	16.6	18.0	0.0	7.0	15.7	0.0	2.3	27.9	0.0
LnGrp Delay(d),s/veh	53.6	49.3	0.0	98.3	49.1	0.0	157.1	46.4	0.0	40.7	95.6	0.0
LnGrp LOS	D	D		F	D		F	D		D	F	
Approach Vol, veh/h		997			1780			1134			1426	
Approach Delay, s/veh		50.4			69.7			63.7			90.2	
Approach LOS		D			E			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	47.0	17.2	44.8	11.0	47.0	30.0	32.0
Change Period (Y+Rc), s	5.0	6.0	5.5	* 5.5	5.0	6.0	5.0	5.5
Max Green Setting (Gmax), s	6.0	41.0	11.0	* 41	6.0	41.0	25.0	26.5
Max Q Clear Time (g_c+I1), s	8.0	43.0	10.9	36.1	8.0	33.6	27.0	26.8
Green Ext Time (p_c), s	0.0	0.0	0.1	3.2	0.0	7.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	70.3
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	10	485	0	5	5	120	195	5	10	455	175
Future Volume (veh/h)	145	10	485	0	5	5	120	195	5	10	455	175
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1814	1814	1850	1814	1850	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	158	11	0	0	5	5	130	212	5	11	495	0
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	411	14	247	0	134	134	585	1014	24	811	1042	886
Arrive On Green	0.16	0.16	0.00	0.00	0.16	0.16	0.57	0.57	0.57	0.57	0.57	0.00
Sat Flow, veh/h	1286	90	1542	0	833	833	899	1765	42	1160	1814	1542
Grp Volume(v), veh/h	169	0	0	0	0	10	130	0	217	11	495	0
Grp Sat Flow(s),veh/h/ln	1375	0	1542	0	0	1667	899	0	1806	1160	1814	1542
Q Serve(g_s), s	3.9	0.0	0.0	0.0	0.0	0.2	3.4	0.0	2.0	0.2	5.4	0.0
Cycle Q Clear(g_c), s	4.0	0.0	0.0	0.0	0.0	0.2	8.8	0.0	2.0	2.1	5.4	0.0
Prop In Lane	0.93		1.00	0.00		0.50	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	426	0	247	0	0	267	585	0	1038	811	1042	886
V/C Ratio(X)	0.40	0.00	0.00	0.00	0.00	0.04	0.22	0.00	0.21	0.01	0.48	0.00
Avail Cap(c_a), veh/h	888	0	749	0	0	810	585	0	1038	811	1042	886
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.7	0.0	0.0	0.0	0.0	12.0	6.8	0.0	3.5	4.0	4.2	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.0	0.0	0.1	0.9	0.0	0.5	0.0	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.0	0.0	0.0	0.1	1.0	0.0	1.1	0.1	3.1	0.0
LnGrp Delay(d),s/veh	14.3	0.0	0.0	0.0	0.0	12.1	7.7	0.0	4.0	4.0	5.8	0.0
LnGrp LOS	B					B	A		A	A	A	
Approach Vol, veh/h		169			10			347			506	
Approach Delay, s/veh		14.3			12.1			5.3			5.7	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		24.0		9.9		24.0		9.9
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		19.5		16.5		19.5		16.5
Max Q Clear Time (g_c+I1), s		10.8		6.0		7.4		2.2
Green Ext Time (p_c), s		3.5		0.6		4.2		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	7.1
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	13.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	10	50	125	55	90	25	270	15	85	90	15
Future Vol, veh/h	20	10	50	125	55	90	25	270	15	85	90	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	110	-	-	110	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	11	54	136	60	98	27	293	16	92	98	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	726	655	106	679	655	302	114	0	0	310	0	0
Stage 1	291	291	-	356	356	-	-	-	-	-	-	-
Stage 2	435	364	-	323	299	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	340	386	948	366	386	738	1475	-	-	1250	-	-
Stage 1	717	672	-	661	629	-	-	-	-	-	-	-
Stage 2	600	624	-	689	666	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	239	351	948	314	351	738	1475	-	-	1250	-	-
Mov Cap-2 Maneuver	239	351	-	314	351	-	-	-	-	-	-	-
Stage 1	704	623	-	649	617	-	-	-	-	-	-	-
Stage 2	461	613	-	591	617	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14	35.3	0.6	3.6
HCM LOS	B	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1475	-	-	485	399	1250	-	-
HCM Lane V/C Ratio	0.018	-	-	0.179	0.736	0.074	-	-
HCM Control Delay (s)	7.5	-	-	14	35.3	8.1	-	-
HCM Lane LOS	A	-	-	B	E	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	5.8	0.2	-	-

Intersection	
Int Delay, s/veh	4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	45	80	20	65	40
Future Vol, veh/h	30	45	80	20	65	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	49	87	22	71	43

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	283	98	0	0	109	0
Stage 1	98	-	-	-	-	-
Stage 2	185	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	707	958	-	-	1481	-
Stage 1	926	-	-	-	-	-
Stage 2	847	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	672	958	-	-	1481	-
Mov Cap-2 Maneuver	672	-	-	-	-	-
Stage 1	926	-	-	-	-	-
Stage 2	805	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.9	0	4.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	819	1481	-
HCM Lane V/C Ratio	-	-	0.1	0.048	-
HCM Control Delay (s)	-	-	9.9	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	75	20	20	350	340	95
Future Vol, veh/h	75	20	20	350	340	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	82	22	22	380	370	103

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	845	421	473	0	-	0
Stage 1	421	-	-	-	-	-
Stage 2	424	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	333	632	1089	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	660	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	324	632	1089	-	-	-
Mov Cap-2 Maneuver	324	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	643	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.9	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1089	-	361	-	-
HCM Lane V/C Ratio	0.02	-	0.286	-	-
HCM Control Delay (s)	8.4	0	18.9	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.2	-	-

Intersection	
Intersection Delay, s/veh	13.1
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	10	420	15	15	390
Future Vol, veh/h	15	10	420	15	15	390
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	457	16	16	424
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.1	13.5	12.9
HCM LOS	A	B	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	60%	4%
Vol Thru, %	97%	0%	96%
Vol Right, %	3%	40%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	435	25	405
LT Vol	0	15	15
Through Vol	420	0	390
RT Vol	15	10	0
Lane Flow Rate	473	27	440
Geometry Grp	1	1	1
Degree of Util (X)	0.584	0.043	0.55
Departure Headway (Hd)	4.443	5.745	4.499
Convergence, Y/N	Yes	Yes	Yes
Cap	813	620	801
Service Time	2.466	3.808	2.523
HCM Lane V/C Ratio	0.582	0.044	0.549
HCM Control Delay	13.5	9.1	12.9
HCM Lane LOS	B	A	B
HCM 95th-tile Q	3.9	0.1	3.4

HCM 2010 Signalized Intersection Summary
9: Washington St & 32nd Ave

09/21/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	460	345	280	40	240	75	355	995	70	120	1100	630
Future Volume (veh/h)	460	345	280	40	240	75	355	995	70	120	1100	630
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1850	1832	1779	1832	1814	1814	1814	1779	1814	1832	1832
Adj Flow Rate, veh/h	590	397	0	89	282	0	467	1259	0	171	1250	0
Adj No. of Lanes	2	1	1	1	1	1	2	2	1	1	2	1
Peak Hour Factor	0.78	0.87	0.96	0.45	0.85	0.75	0.76	0.79	0.75	0.70	0.88	0.97
Percent Heavy Veh, %	1	0	1	4	1	2	2	2	4	2	1	1
Cap, veh/h	564	473	398	110	282	238	908	1852	813	173	1247	558
Arrive On Green	0.06	0.08	0.00	0.07	0.15	0.00	0.27	0.54	0.00	0.03	0.12	0.00
Sat Flow, veh/h	3384	1850	1557	1694	1832	1542	3351	3446	1512	1727	3480	1557
Grp Volume(v), veh/h	590	397	0	89	282	0	467	1259	0	171	1250	0
Grp Sat Flow(s),veh/h/ln	1692	1850	1557	1694	1832	1542	1676	1723	1512	1727	1740	1557
Q Serve(g_s), s	20.0	25.4	0.0	6.2	18.5	0.0	14.2	31.9	0.0	11.9	43.0	0.0
Cycle Q Clear(g_c), s	20.0	25.4	0.0	6.2	18.5	0.0	14.2	31.9	0.0	11.9	43.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	564	473	398	110	282	238	908	1852	813	173	1247	558
V/C Ratio(X)	1.05	0.84	0.00	0.81	1.00	0.00	0.51	0.68	0.00	0.99	1.00	0.00
Avail Cap(c_a), veh/h	564	473	398	127	282	238	908	1852	813	173	1247	558
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	0.90	0.90	0.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	56.7	52.5	0.0	55.4	50.7	0.0	37.1	20.2	0.0	58.0	52.9	0.0
Incr Delay (d2), s/veh	50.5	13.8	0.0	24.1	53.2	0.0	0.2	1.8	0.0	59.7	24.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.3	14.8	0.0	3.7	13.5	0.0	6.6	15.5	0.0	8.6	24.9	0.0
LnGrp Delay(d),s/veh	107.2	66.3	0.0	79.5	103.9	0.0	37.3	22.1	0.0	117.7	76.9	0.0
LnGrp LOS	F	E		E	F		D	C		F	F	
Approach Vol, veh/h		987			371			1726			1421	
Approach Delay, s/veh		90.7			98.0			26.2			81.8	
Approach LOS		F			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	38.5	49.0	12.8	37.2	17.0	70.5	25.0	25.0
Change Period (Y+Rc), s	5.5	* 6	5.0	6.5	5.0	5.5	5.0	6.5
Max Green Setting (Gmax), s	16.0	* 43	9.0	29.5	12.0	47.5	20.0	18.5
Max Q Clear Time (g_c+I1), s	16.2	45.0	8.2	27.4	13.9	33.9	22.0	20.5
Green Ext Time (p_c), s	0.0	0.0	0.0	1.1	0.0	11.2	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	63.8
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	695	70	95	745	45	150	195	60	55	240	65
Future Volume (veh/h)	90	695	70	95	745	45	150	195	60	55	240	65
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814	1814
Adj Flow Rate, veh/h	98	755	76	103	810	49	163	212	65	60	261	71
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	239	979	832	270	979	832	317	538	457	354	538	457
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	641	1814	1542	658	1814	1542	1044	1814	1542	1098	1814	1542
Grp Volume(v), veh/h	98	755	76	103	810	49	163	212	65	60	261	71
Grp Sat Flow(s),veh/h/ln	641	1814	1542	658	1814	1542	1044	1814	1542	1098	1814	1542
Q Serve(g_s), s	8.3	18.0	1.3	8.0	20.4	0.8	8.4	5.1	1.7	2.5	6.5	1.9
Cycle Q Clear(g_c), s	28.7	18.0	1.3	26.1	20.4	0.8	14.9	5.1	1.7	7.7	6.5	1.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	979	833	270	979	833	317	538	457	354	538	457
V/C Ratio(X)	0.41	0.77	0.09	0.38	0.83	0.06	0.51	0.39	0.14	0.17	0.49	0.16
Avail Cap(c_a), veh/h	239	979	833	270	979	833	317	538	457	354	538	457
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.4	10.0	6.1	20.2	10.5	6.0	22.0	15.4	14.2	18.5	15.9	14.3
Incr Delay (d2), s/veh	5.1	5.9	0.2	4.0	8.0	0.1	5.9	2.2	0.7	1.0	3.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	10.4	0.6	1.8	12.1	0.4	2.9	2.9	0.8	0.9	3.7	0.9
LnGrp Delay(d),s/veh	27.6	15.8	6.3	24.3	18.5	6.1	27.9	17.6	14.9	19.5	19.0	15.0
LnGrp LOS	C	B	A	C	B	A	C	B	B	B	B	B
Approach Vol, veh/h		929			962			440			392	
Approach Delay, s/veh		16.3			18.5			21.0			18.4	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.8		34.2		20.8		34.2
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		16.3		29.7		16.3		29.7
Max Q Clear Time (g_c+I1), s		16.9		30.7		9.7		28.1
Green Ext Time (p_c), s		0.0		0.0		2.4		1.4

Intersection Summary	
HCM 2010 Ctrl Delay	18.1
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	235	205	140	190	145	90	1220	130	125	1385	215
Future Volume (veh/h)	210	235	205	140	190	145	90	1220	130	125	1385	215
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1832	1850	1850	1832	1832	1832	1832	1850	1850	1832	1850
Adj Flow Rate, veh/h	241	305	238	165	209	158	108	1298	188	184	1489	253
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.77	0.86	0.85	0.91	0.92	0.83	0.94	0.69	0.68	0.93	0.85
Percent Heavy Veh, %	2	1	0	0	1	1	1	1	0	0	1	0
Cap, veh/h	249	295	413	197	295	424	177	1476	771	196	1450	760
Arrive On Green	0.07	0.16	0.16	0.07	0.16	0.16	0.10	0.42	0.42	0.11	0.42	0.42
Sat Flow, veh/h	1727	1832	1570	1762	1832	1557	1744	3480	1571	1762	3480	1572
Grp Volume(v), veh/h	241	305	238	165	209	158	108	1298	188	184	1489	253
Grp Sat Flow(s),veh/h/ln	1727	1832	1570	1762	1832	1557	1744	1740	1571	1762	1740	1572
Q Serve(g_s), s	6.0	14.5	2.0	6.0	9.7	7.4	5.3	30.8	6.2	9.3	37.5	4.0
Cycle Q Clear(g_c), s	6.0	14.5	2.0	6.0	9.7	7.4	5.3	30.8	6.2	9.3	37.5	4.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	295	413	197	295	424	177	1476	771	196	1450	760
V/C Ratio(X)	0.97	1.03	0.58	0.84	0.71	0.37	0.61	0.88	0.24	0.94	1.03	0.33
Avail Cap(c_a), veh/h	249	295	413	197	295	424	177	1476	771	196	1450	760
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.89	0.89	0.26	0.26	0.26
Uniform Delay (d), s/veh	36.1	37.8	13.5	32.5	35.7	26.5	38.7	23.8	13.3	39.7	26.3	4.5
Incr Delay (d2), s/veh	47.9	61.3	2.7	26.0	8.8	0.9	3.9	7.1	0.7	19.6	19.8	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	12.3	3.7	2.6	5.7	3.3	2.8	16.2	2.9	5.6	21.9	1.8
LnGrp Delay(d),s/veh	84.0	99.1	16.2	58.5	44.5	27.5	42.6	30.9	13.9	59.3	46.0	4.9
LnGrp LOS	F	F	B	E	D	C	D	C	B	E	F	A
Approach Vol, veh/h		784			532			1594			1926	
Approach Delay, s/veh		69.3			43.8			29.7			41.9	
Approach LOS		E			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.7	44.0	11.0	21.0	15.0	44.7	11.0	21.0
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	9.0	* 38	6.0	14.5	10.0	36.5	6.0	14.5
Max Q Clear Time (g_c+I1), s	7.3	39.5	8.0	16.5	11.3	32.8	8.0	11.7
Green Ext Time (p_c), s	0.8	0.0	0.0	0.0	0.0	3.3	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	42.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	190	15	85	135	60	100	1550	110	150	1485	270
Future Volume (veh/h)	175	190	15	85	135	60	100	1550	110	150	1485	270
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1850	1850	1850	1850	1850	1850	1850	1850	1832	1850	1850
Adj Flow Rate, veh/h	227	241	23	101	144	80	133	1742	141	234	1833	380
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.77	0.79	0.65	0.84	0.94	0.75	0.75	0.89	0.78	0.64	0.81	0.71
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	1	0	0
Cap, veh/h	239	239	479	172	233	408	309	2053	1018	233	1860	937
Arrive On Green	0.07	0.13	0.13	0.06	0.13	0.13	0.35	1.00	1.00	0.09	0.35	0.35
Sat Flow, veh/h	1762	1850	1572	1762	1850	1572	1762	3515	1572	1744	3515	1572
Grp Volume(v), veh/h	227	241	23	101	144	80	133	1742	141	234	1833	380
Grp Sat Flow(s),veh/h/ln	1762	1850	1572	1762	1850	1572	1762	1758	1572	1744	1758	1572
Q Serve(g_s), s	8.0	15.5	0.2	5.9	8.9	4.8	6.9	0.0	0.0	16.0	62.1	13.1
Cycle Q Clear(g_c), s	8.0	15.5	0.2	5.9	8.9	4.8	6.9	0.0	0.0	16.0	62.1	13.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	239	479	172	233	408	309	2053	1018	233	1860	937
V/C Ratio(X)	0.95	1.01	0.05	0.59	0.62	0.20	0.43	0.85	0.14	1.01	0.99	0.41
Avail Cap(c_a), veh/h	239	239	479	177	239	413	309	2053	1018	233	1860	937
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.67	0.67	0.67
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.91	0.85	0.85	0.85
Uniform Delay (d), s/veh	49.2	52.2	21.4	42.7	49.7	34.7	34.3	0.0	0.0	54.6	38.3	14.1
Incr Delay (d2), s/veh	43.9	60.4	0.1	5.2	6.0	0.4	0.3	4.2	0.3	56.0	16.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	11.9	0.5	3.1	4.9	2.1	3.3	1.2	0.1	11.3	34.4	5.9
LnGrp Delay(d),s/veh	93.1	112.7	21.5	48.0	55.7	35.1	34.6	4.2	0.3	110.7	54.4	15.2
LnGrp LOS	F	F	C	D	E	D	C	A	A	F	D	B
Approach Vol, veh/h		491			325			2016			2447	
Approach Delay, s/veh		99.4			48.2			5.9			53.7	
Approach LOS		F			D			A			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.6	70.0	12.6	22.0	21.0	76.6	13.0	21.6
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	5.0	6.5
Max Green Setting (Gmax), s	10.0	* 64	8.0	15.5	16.0	57.5	8.0	15.5
Max Q Clear Time (g_c+I1), s	10.9	64.1	7.9	17.5	18.0	2.0	10.0	10.9
Green Ext Time (p_c), s	0.1	0.0	0.0	0.0	0.0	41.9	0.0	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	39.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	415	190	30	45	90	65	860	50	360	910	75
Future Volume (veh/h)	80	415	190	30	45	90	65	860	50	360	910	75
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1814	1814	1814	1814	1814	1814	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	87	451	207	33	49	98	71	935	54	391	989	82
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	111	455	387	43	384	327	91	992	57	397	1644	735
Arrive On Green	0.06	0.25	0.25	0.02	0.21	0.21	0.05	0.30	0.30	0.23	0.48	0.48
Sat Flow, veh/h	1727	1814	1542	1727	1814	1542	1727	3312	191	1727	3446	1542
Grp Volume(v), veh/h	87	451	207	33	49	98	71	486	503	391	989	82
Grp Sat Flow(s),veh/h/ln	1727	1814	1542	1727	1814	1542	1727	1723	1780	1727	1723	1542
Q Serve(g_s), s	4.5	22.3	10.5	1.7	2.0	4.8	3.7	24.8	24.8	20.3	18.9	2.6
Cycle Q Clear(g_c), s	4.5	22.3	10.5	1.7	2.0	4.8	3.7	24.8	24.8	20.3	18.9	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	111	455	387	43	384	327	91	516	533	397	1644	735
V/C Ratio(X)	0.78	0.99	0.53	0.77	0.13	0.30	0.78	0.94	0.94	0.98	0.60	0.11
Avail Cap(c_a), veh/h	196	455	387	77	384	327	178	516	533	397	1644	735
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	41.5	33.6	29.2	43.6	28.7	29.8	42.1	30.8	30.8	34.5	17.3	13.0
Incr Delay (d2), s/veh	11.4	39.5	1.4	24.0	0.1	0.5	13.6	27.7	27.1	38.6	1.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	16.1	4.6	1.1	1.0	2.1	2.1	15.7	16.2	13.9	9.3	1.2
LnGrp Delay(d),s/veh	52.9	73.1	30.6	67.6	28.9	30.4	55.7	58.5	57.9	73.1	18.7	13.3
LnGrp LOS	D	E	C	E	C	C	E	E	E	E	B	B
Approach Vol, veh/h		745			180			1060			1462	
Approach Delay, s/veh		58.9			36.8			58.0			33.0	
Approach LOS		E			D			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.2	31.0	6.7	27.1	9.2	46.9	10.3	23.6
Change Period (Y+Rc), s	4.5	4.0	4.5	4.5	4.5	4.0	4.5	4.5
Max Green Setting (Gmax), s	20.7	25.2	4.0	22.6	9.3	36.6	10.2	16.4
Max Q Clear Time (g_c+I1), s	22.3	26.8	3.7	24.3	5.7	20.9	6.5	6.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	11.2	0.1	2.8

Intersection Summary	
HCM 2010 Ctrl Delay	46.5
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	54
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	45	305	50	175	220	5	30	215	125	5	270	40
Future Vol, veh/h	45	305	50	175	220	5	30	215	125	5	270	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	332	54	190	239	5	33	234	136	5	293	43
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	67.9	26.7	71.1	50.8
HCM LOS	F	D	F	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	100%	0%	100%	0%	2%
Vol Thru, %	58%	0%	86%	0%	98%	86%
Vol Right, %	34%	0%	14%	0%	2%	13%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	370	45	355	175	225	315
LT Vol	30	45	0	175	0	5
Through Vol	215	0	305	0	220	270
RT Vol	125	0	50	0	5	40
Lane Flow Rate	402	49	386	190	245	342
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.984	0.134	0.993	0.535	0.651	0.875
Departure Headway (Hd)	8.812	9.888	9.26	10.129	9.586	9.196
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	410	365	394	356	377	394
Service Time	6.887	7.588	6.96	7.906	7.363	7.274
HCM Lane V/C Ratio	0.98	0.134	0.98	0.534	0.65	0.868
HCM Control Delay	71.1	14.1	74.7	24.1	28.7	50.8
HCM Lane LOS	F	B	F	C	D	F
HCM 95th-tile Q	11.8	0.5	11.9	3	4.4	8.7

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	65	40	35	340	490	105
Future Vol, veh/h	65	40	35	340	490	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	43	38	370	533	114

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1036	590	647	0	-	0
Stage 1	590	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	256	508	939	-	-	-
Stage 1	554	-	-	-	-	-
Stage 2	645	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	243	508	939	-	-	-
Mov Cap-2 Maneuver	243	-	-	-	-	-
Stage 1	554	-	-	-	-	-
Stage 2	612	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.9	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	939	-	303	-	-
HCM Lane V/C Ratio	0.041	-	0.377	-	-
HCM Control Delay (s)	9	0	23.9	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.7	-	-

Intersection	
Intersection Delay, s/veh	47
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	215	50	70	5	15	5	75	240	10	10	355	230
Future Vol, veh/h	215	50	70	5	15	5	75	240	10	10	355	230
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	234	54	76	5	16	5	82	261	11	11	386	250
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	23.5	11.7	20.5	76.1
HCM LOS	C	B	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	23%	64%	20%	2%
Vol Thru, %	74%	15%	60%	60%
Vol Right, %	3%	21%	20%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	325	335	25	595
LT Vol	75	215	5	10
Through Vol	240	50	15	355
RT Vol	10	70	5	230
Lane Flow Rate	353	364	27	647
Geometry Grp	1	1	1	1
Degree of Util (X)	0.634	0.682	0.059	1.057
Departure Headway (Hd)	6.651	6.921	8.213	5.884
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	548	524	439	621
Service Time	4.651	4.921	6.213	3.884
HCM Lane V/C Ratio	0.644	0.695	0.062	1.042
HCM Control Delay	20.5	23.5	11.7	76.1
HCM Lane LOS	C	C	B	F
HCM 95th-tile Q	4.4	5.2	0.2	17.9

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	75	30	165	5	10	5	85	160	10	10	185	125
Future Vol, veh/h	75	30	165	5	10	5	85	160	10	10	185	125
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	82	33	179	5	11	5	92	174	11	11	201	136

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	663	661	269	761	723	179	337	0	0	185	0	0
Stage 1	291	291	-	364	364	-	-	-	-	-	-	-
Stage 2	372	370	-	397	359	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	375	383	770	322	352	864	1222	-	-	1390	-	-
Stage 1	717	672	-	655	624	-	-	-	-	-	-	-
Stage 2	648	620	-	629	627	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	337	347	770	213	319	864	1222	-	-	1390	-	-
Mov Cap-2 Maneuver	337	347	-	213	319	-	-	-	-	-	-	-
Stage 1	657	665	-	600	572	-	-	-	-	-	-	-
Stage 2	579	568	-	454	621	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.8	16.7	2.7	0.2
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1222	-	-	337	648	330	1390	-	-
HCM Lane V/C Ratio	0.076	-	-	0.242	0.327	0.066	0.008	-	-
HCM Control Delay (s)	8.2	0	-	19.1	13.2	16.7	7.6	0	-
HCM Lane LOS	A	A	-	C	B	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.9	1.4	0.2	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	255	655	355	685	815	140	145	895	470	120	1190	240
Future Volume (veh/h)	255	655	355	685	815	140	145	895	470	120	1190	240
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1832	1832	1850	1832	1832	1832	1832	1814	1814	1832	1832	1832
Adj Flow Rate, veh/h	271	753	0	787	1087	0	184	973	0	140	1308	0
Adj No. of Lanes	2	2	1	2	2	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.87	0.69	0.87	0.75	0.44	0.79	0.92	0.87	0.86	0.91	0.81
Percent Heavy Veh, %	1	1	0	1	1	1	1	2	2	1	1	1
Cap, veh/h	282	769	347	677	1161	519	147	1221	546	199	1233	552
Arrive On Green	0.14	0.37	0.00	0.20	0.33	0.00	0.03	0.24	0.00	0.03	0.24	0.00
Sat Flow, veh/h	3384	3480	1572	3384	3480	1557	1744	3446	1542	1744	3480	1557
Grp Volume(v), veh/h	271	753	0	787	1087	0	184	973	0	140	1308	0
Grp Sat Flow(s),veh/h/ln	1692	1740	1572	1692	1740	1557	1744	1723	1542	1744	1740	1557
Q Serve(g_s), s	9.5	25.7	0.0	24.0	36.3	0.0	6.0	31.9	0.0	6.0	42.5	0.0
Cycle Q Clear(g_c), s	9.5	25.7	0.0	24.0	36.3	0.0	6.0	31.9	0.0	6.0	42.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	282	769	347	677	1161	519	147	1221	546	199	1233	552
V/C Ratio(X)	0.96	0.98	0.00	1.16	0.94	0.00	1.25	0.80	0.00	0.70	1.06	0.00
Avail Cap(c_a), veh/h	282	769	347	677	1175	525	147	1221	546	199	1233	552
HCM Platoon Ratio	1.67	1.67	1.67	1.00	1.00	1.00	0.67	0.67	0.67	0.67	0.67	0.67
Upstream Filter(I)	0.39	0.39	0.00	1.00	1.00	0.00	0.59	0.59	0.00	0.85	0.85	0.00
Uniform Delay (d), s/veh	51.5	37.6	0.0	48.0	38.8	0.0	33.3	41.7	0.0	29.9	45.8	0.0
Incr Delay (d2), s/veh	24.0	15.6	0.0	88.9	13.9	0.0	141.0	3.3	0.0	7.9	41.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	13.9	0.0	19.5	19.6	0.0	7.8	15.8	0.0	2.2	27.5	0.0
LnGrp Delay(d),s/veh	75.4	53.2	0.0	136.9	52.7	0.0	174.3	45.0	0.0	37.8	87.2	0.0
LnGrp LOS	E	D		F	D		F	D		D	F	
Approach Vol, veh/h		1024			1874			1157			1448	
Approach Delay, s/veh		59.1			88.1			65.6			82.5	
Approach LOS		E			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	48.5	15.5	45.5	11.0	48.5	29.0	32.0
Change Period (Y+Rc), s	5.0	6.0	5.5	* 5.5	5.0	6.0	5.0	5.5
Max Green Setting (Gmax), s	6.0	42.0	10.0	* 41	6.0	42.0	24.0	26.5
Max Q Clear Time (g_c+I1), s	8.0	44.5	11.5	38.3	8.0	33.9	26.0	27.7
Green Ext Time (p_c), s	0.0	0.0	0.0	1.7	0.0	7.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	76.5
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	15	590	0	5	5	135	220	5	10	465	180
Future Volume (veh/h)	180	15	590	0	5	5	135	220	5	10	465	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1850	1814	1814	1850	1814	1850	1814	1814	1850	1814	1814	1814
Adj Flow Rate, veh/h	196	16	0	0	5	5	147	239	5	11	505	0
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	422	21	312	0	169	169	549	1039	22	760	1065	905
Arrive On Green	0.20	0.20	0.00	0.00	0.20	0.20	0.59	0.59	0.59	0.59	0.59	0.00
Sat Flow, veh/h	1285	105	1542	0	833	833	890	1770	37	1131	1814	1542
Grp Volume(v), veh/h	212	0	0	0	0	10	147	0	244	11	505	0
Grp Sat Flow(s),veh/h/ln	1390	0	1542	0	0	1667	890	0	1807	1131	1814	1542
Q Serve(g_s), s	6.0	0.0	0.0	0.0	0.0	0.2	4.8	0.0	2.8	0.2	6.8	0.0
Cycle Q Clear(g_c), s	6.2	0.0	0.0	0.0	0.0	0.2	11.7	0.0	2.8	3.0	6.8	0.0
Prop In Lane	0.92		1.00	0.00		0.50	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	443	0	312	0	0	337	549	0	1061	760	1065	905
V/C Ratio(X)	0.48	0.00	0.00	0.00	0.00	0.03	0.27	0.00	0.23	0.01	0.47	0.00
Avail Cap(c_a), veh/h	1018	0	934	0	0	1010	549	0	1061	760	1065	905
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	16.2	0.0	0.0	0.0	0.0	13.7	8.4	0.0	4.2	4.9	5.1	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.5	0.0	1.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.0	0.0	0.0	0.0	0.1	1.4	0.0	1.5	0.1	3.8	0.0
LnGrp Delay(d),s/veh	17.0	0.0	0.0	0.0	0.0	13.7	9.6	0.0	4.7	5.0	6.6	0.0
LnGrp LOS	B					B	A		A	A	A	
Approach Vol, veh/h		212			10			391			516	
Approach Delay, s/veh		17.0			13.7			6.5			6.5	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		29.6		13.2		29.6		13.2
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		25.1		25.9		25.1		25.9
Max Q Clear Time (g_c+I1), s		13.7		8.2		8.8		2.2
Green Ext Time (p_c), s		4.4		1.1		5.3		1.2

Intersection Summary	
HCM 2010 Ctrl Delay	8.6
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	20.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	10	40	125	55	90	30	330	20	100	110	20
Future Vol, veh/h	15	10	40	125	55	90	30	330	20	100	110	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	110	-	-	110	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	11	43	136	60	98	33	359	22	109	120	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	862	794	130	810	794	370	141	0	0	380	0	0
Stage 1	348	348	-	435	435	-	-	-	-	-	-	-
Stage 2	514	446	-	375	359	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	275	321	920	298	321	676	1442	-	-	1178	-	-
Stage 1	668	634	-	600	580	-	-	-	-	-	-	-
Stage 2	543	574	-	646	627	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	181	285	920	252	285	676	1442	-	-	1178	-	-
Mov Cap-2 Maneuver	181	285	-	252	285	-	-	-	-	-	-	-
Stage 1	653	575	-	586	567	-	-	-	-	-	-	-
Stage 2	406	561	-	548	569	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.8	62.9	0.6	3.6
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1442	-	-	403	328	1178	-	-
HCM Lane V/C Ratio	0.023	-	-	0.175	0.895	0.092	-	-
HCM Control Delay (s)	7.6	-	-	15.8	62.9	8.4	-	-
HCM Lane LOS	A	-	-	C	F	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	8.6	0.3	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	35	20	5	50	30
Future Vol, veh/h	25	35	20	5	50	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	38	22	5	54	33

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	165	24	0	0	27	0
Stage 1	24	-	-	-	-	-
Stage 2	141	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	826	1052	-	-	1587	-
Stage 1	999	-	-	-	-	-
Stage 2	886	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	797	1052	-	-	1587	-
Mov Cap-2 Maneuver	797	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	855	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	4.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	928	1587	-
HCM Lane V/C Ratio	-	-	0.07	0.034	-
HCM Control Delay (s)	-	-	9.2	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	75	20	25	400	410	115
Future Vol, veh/h	75	20	25	400	410	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	82	22	27	435	446	125

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	997	508	571	0	-	0
Stage 1	508	-	-	-	-	-
Stage 2	489	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	271	565	1002	-	-	-
Stage 1	604	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	261	565	1002	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	604	-	-	-	-	-
Stage 2	594	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.7	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1002	-	294	-	-
HCM Lane V/C Ratio	0.027	-	0.351	-	-
HCM Control Delay (s)	8.7	0	23.7	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.5	-	-

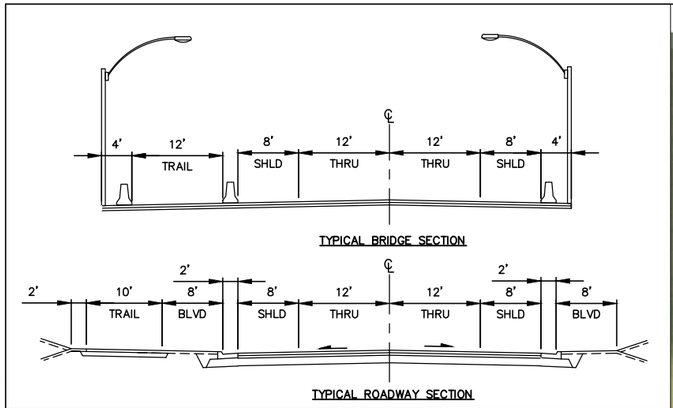
Intersection	
Intersection Delay, s/veh	17.6
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	10	505	20	15	475
Future Vol, veh/h	15	10	505	20	15	475
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	549	22	16	516
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	9.5	18.5	17
HCM LOS	A	C	C

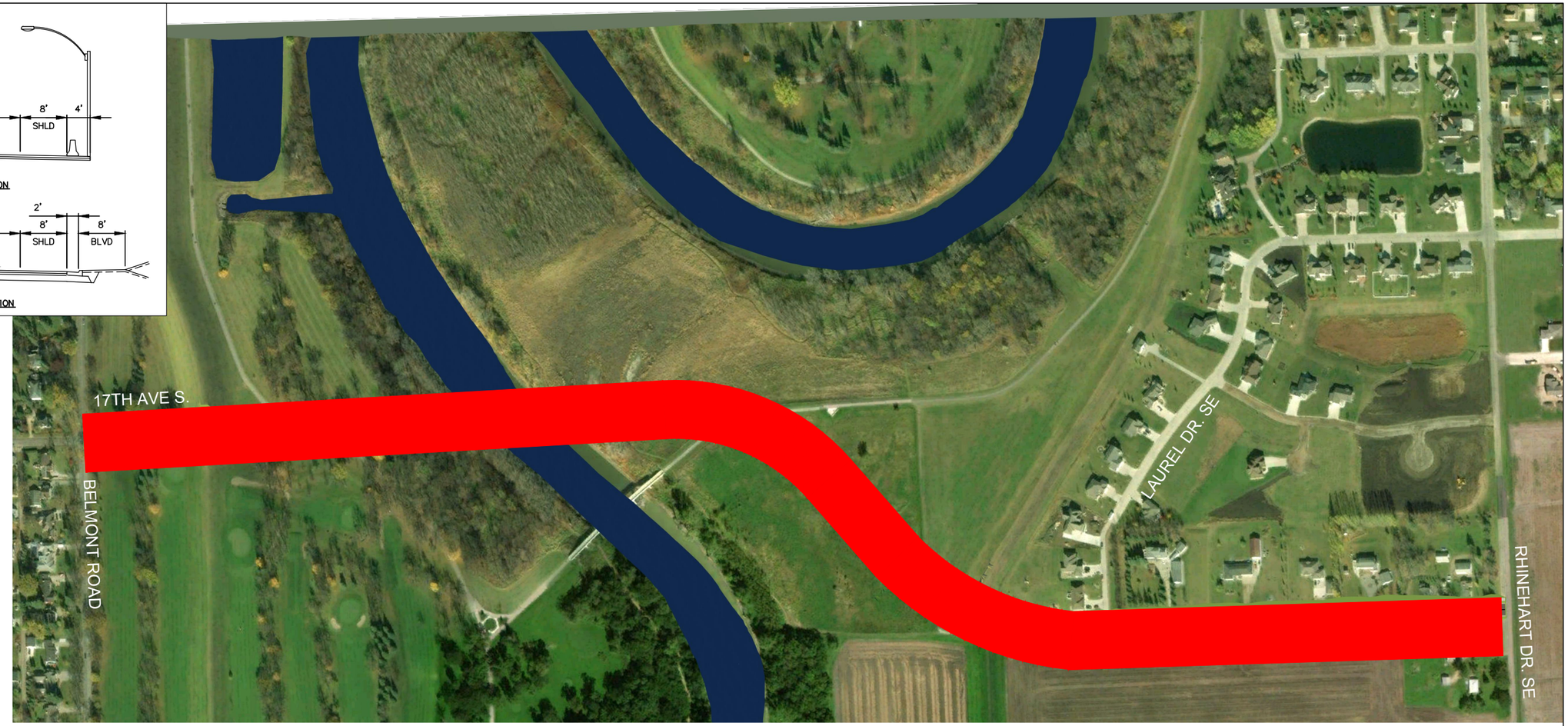
Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	60%	3%
Vol Thru, %	96%	0%	97%
Vol Right, %	4%	40%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	525	25	490
LT Vol	0	15	15
Through Vol	505	0	475
RT Vol	20	10	0
Lane Flow Rate	571	27	533
Geometry Grp	1	1	1
Degree of Util (X)	0.721	0.046	0.682
Departure Headway (Hd)	4.549	6.129	4.611
Convergence, Y/N	Yes	Yes	Yes
Cap	793	580	783
Service Time	2.583	4.216	2.645
HCM Lane V/C Ratio	0.72	0.047	0.681
HCM Control Delay	18.5	9.5	17
HCM Lane LOS	C	A	C
HCM 95th-tile Q	6.3	0.1	5.5

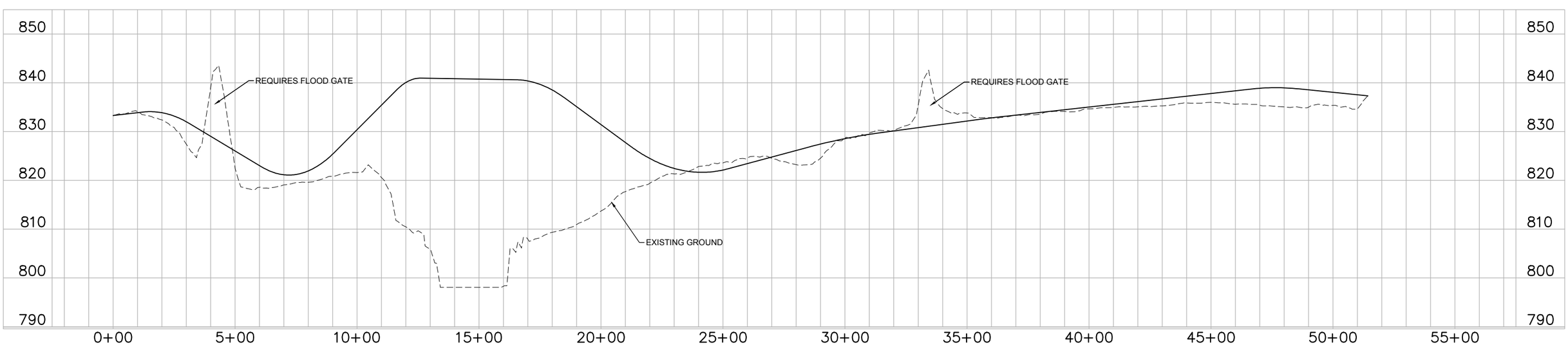
Appendix B: River Crossing Concept Drawings



QUANTITIES

ITEM		UNIT
COMMON EX.	12500	CY
COMMON FILL	22300	CY
WALK	56500	SF
BITUMINTUS	205800	SF
CURB AND GUTTER	6800	LF
BRIDGE	1200	LF





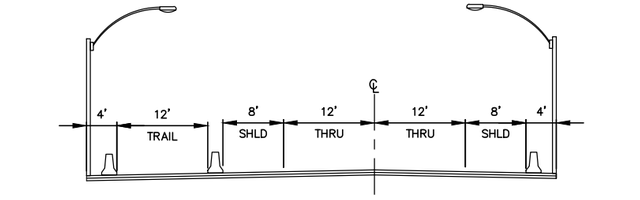
PLANNING CONCEPTS ONLY.
NOT FOR CONSTRUCTION.

GRAND FORKS
17TH AVENUE RIVER CROSSING
LOW BRIDGE OPTION WITH FLOOD GATE

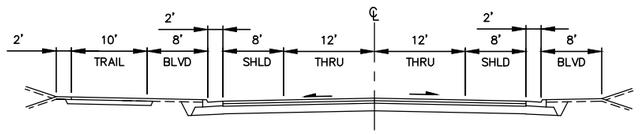
NORTH

0 200 400
HORIZONTAL
SCALE IN FEET

K:\TWC_Civil\MPO\GRAND FORKS\ATAC River Crossing - Grand Forks\CAD\Plan Sheets\Exhibits\17TH AVE-OPTION_LOW BRIDGE-A-SIMPLE.dwg October 02, 2018 - 12:42pm

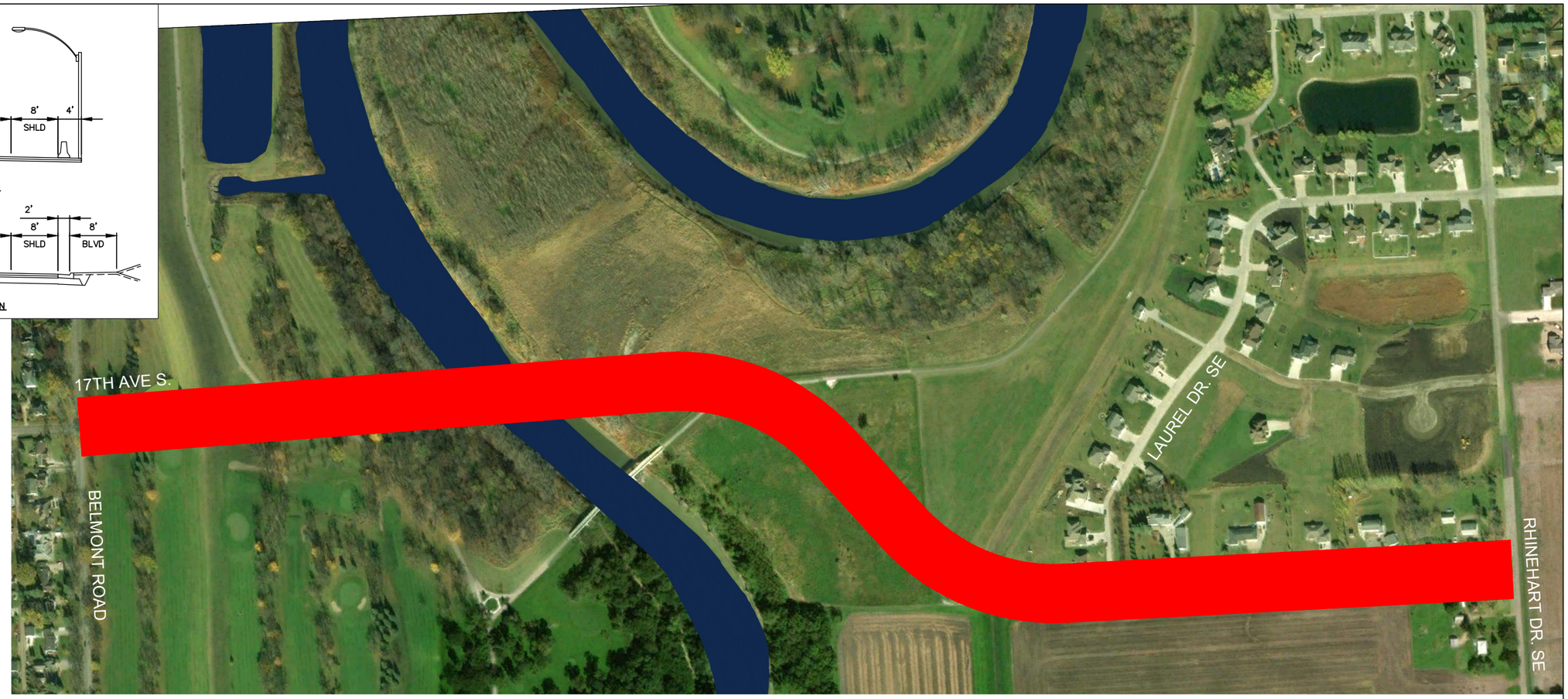


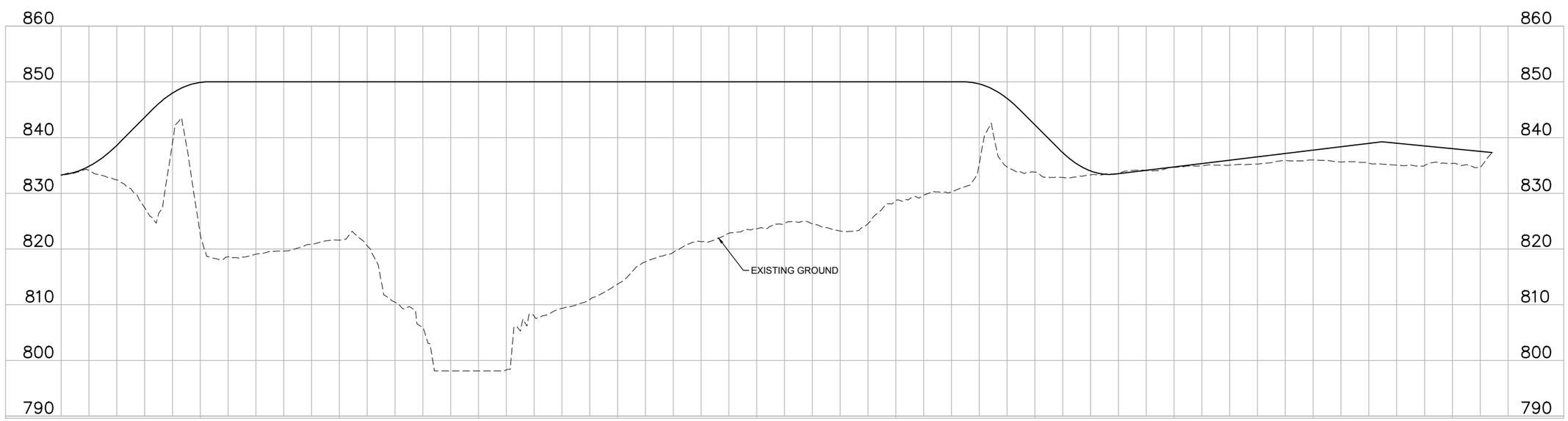
TYPICAL BRIDGE SECTION



TYPICAL ROADWAY SECTION

QUANTITIES		
ITEM		UNIT
COMMON EX.	800	CY
COMMON FILL	29300	CY
WALK	56500	SF
BITUMINTUS	205800	SF
CURB AND GUTTER	2900	LF
BRIDGE	3100	LF





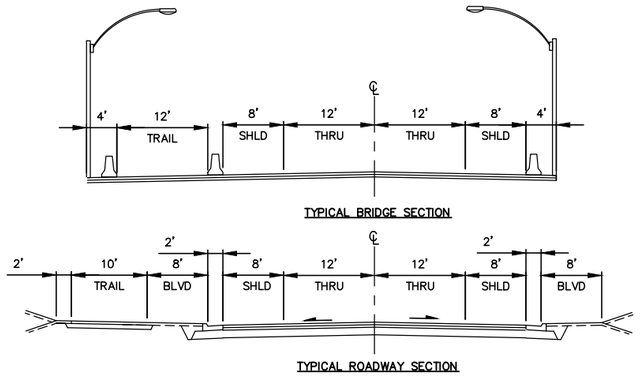
PLANNING CONCEPTS ONLY.
NOT FOR CONSTRUCTION.

GRAND FORKS
17TH AVENUE RIVER CROSSING
HIGH BRIDGE OPTION

NORTH

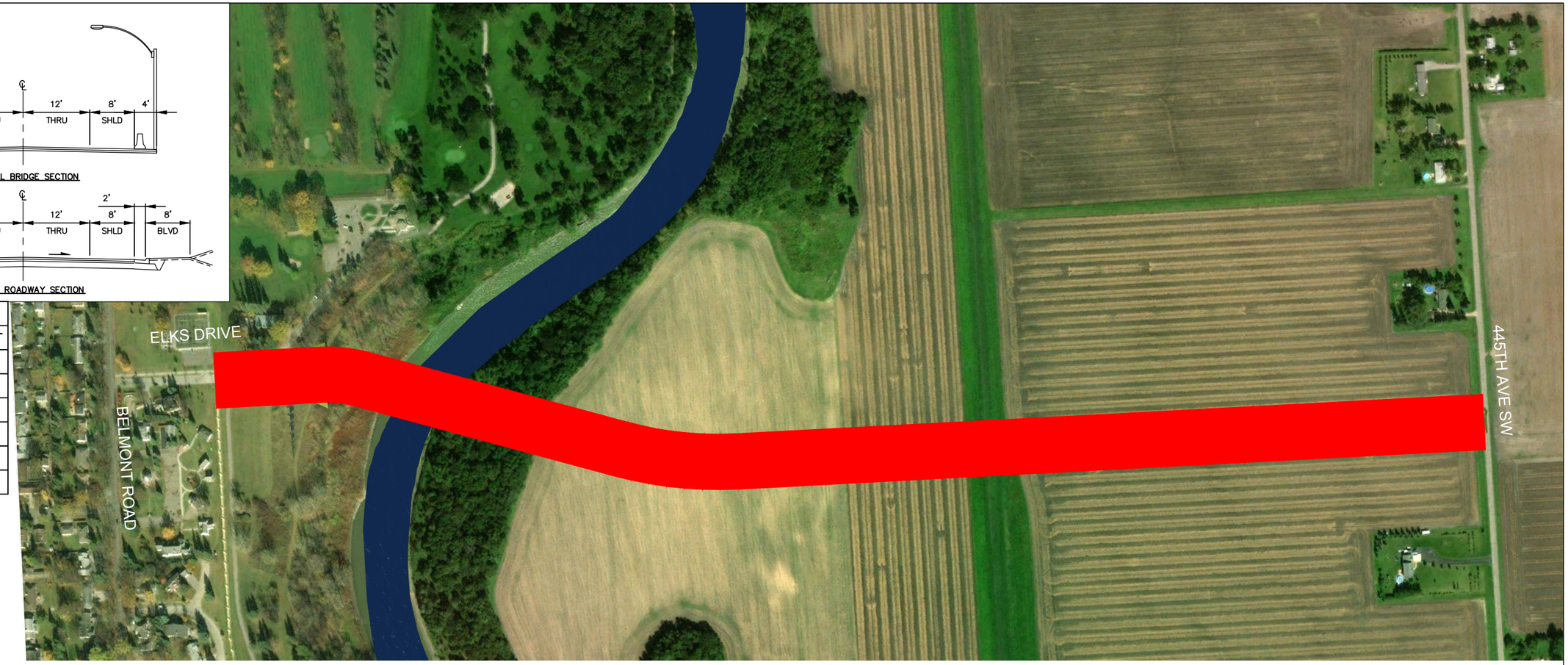
0 200 400
HORIZONTAL
SCALE IN FEET

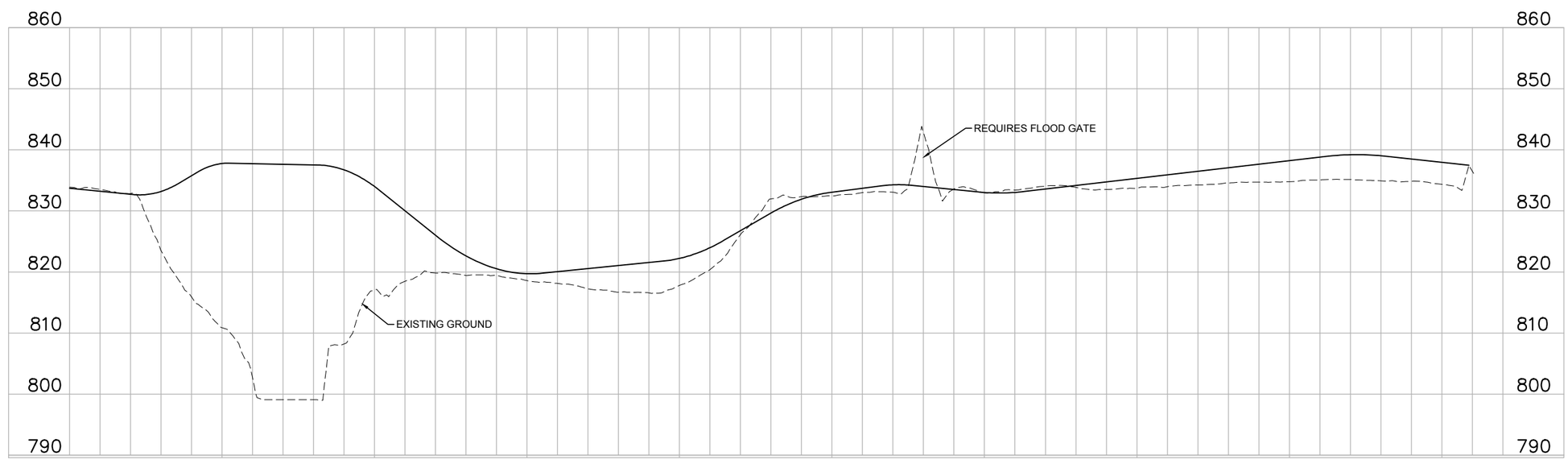
K:\TWC_Civil\MPO\GRAND FORKS\ATAC River Crossing - Grand Forks\CAD\Plan Sheets\Exhibits\17TH AVE-OPTION_HIGH BRIDGE-SIMPLE.dwg October 02, 2018 - 12:42pm



QUANTITIES

ITEM		UNIT
COMMON EX.	3800	CY
COMMON FILL	31600	CY
WALK	46100	SF
BITUMINTUS	184200	SF
CURB AND GUTTER	7800	LF
BRIDGE	700	LF





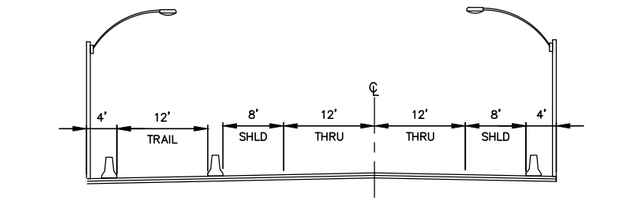
PLANNING CONCEPTS ONLY.
NOT FOR CONSTRUCTION.

GRAND FORKS
ELKS DRIVE RIVER CROSSING
LOW BRIDGE WITH FLOOD GATE

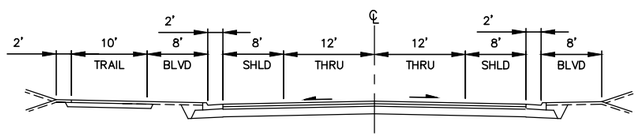
NORTH

0 200 400
HORIZONTAL
SCALE IN FEET

K:\TWC_Civil\MPO\GRAND FORKS\ATAC River Crossing - Grand Forks\CAD\Plan Sheets\Exhibits\ELKS DRIVE_LOW BRIDGE A_SIMPLE.dwg October 02, 2018 - 12:43pm



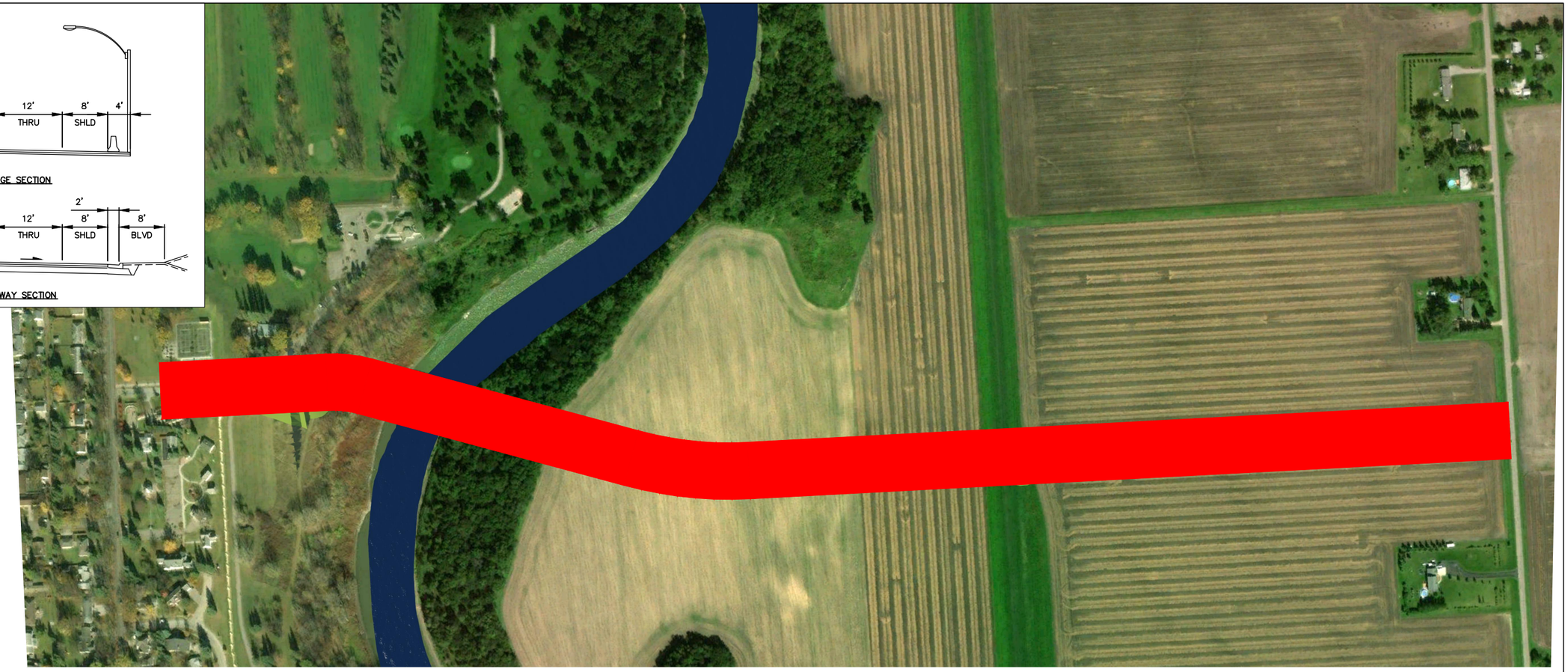
TYPICAL BRIDGE SECTION

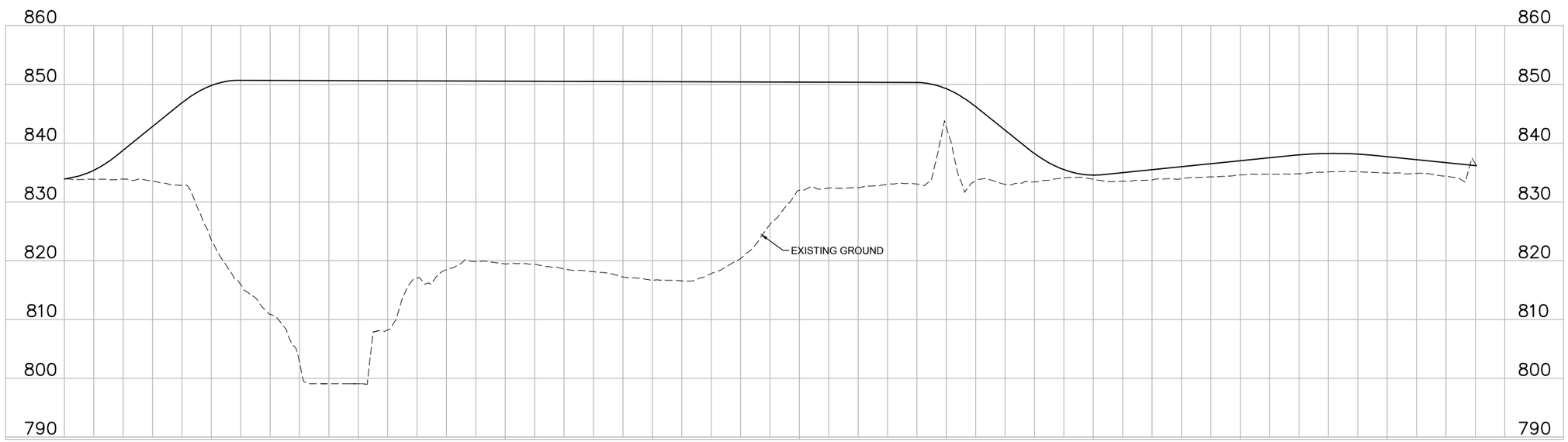


TYPICAL ROADWAY SECTION

QUANTITIES

ITEM		UNIT
COMMON EX.	500	CY
COMMON FILL	42900	CY
WALK	48100	SF
BITUMINTUS	192200	SF
CURB AND GUTTER	4600	LF
BRIDGE	2500	LF





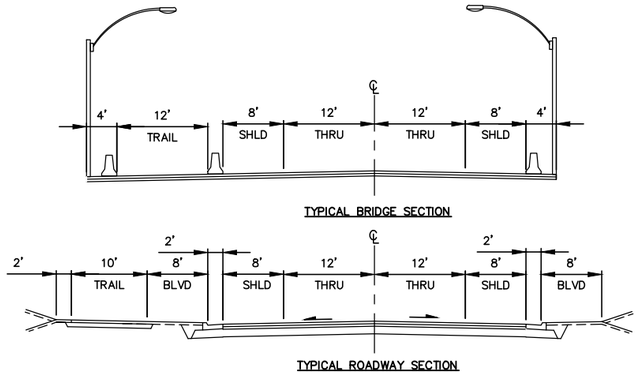
PLANNING CONCEPTS ONLY.
NOT FOR CONSTRUCTION.

GRAND FORKS
ELKS DRIVE RIVER CROSSING
HIGH BRIDGE

NORTH

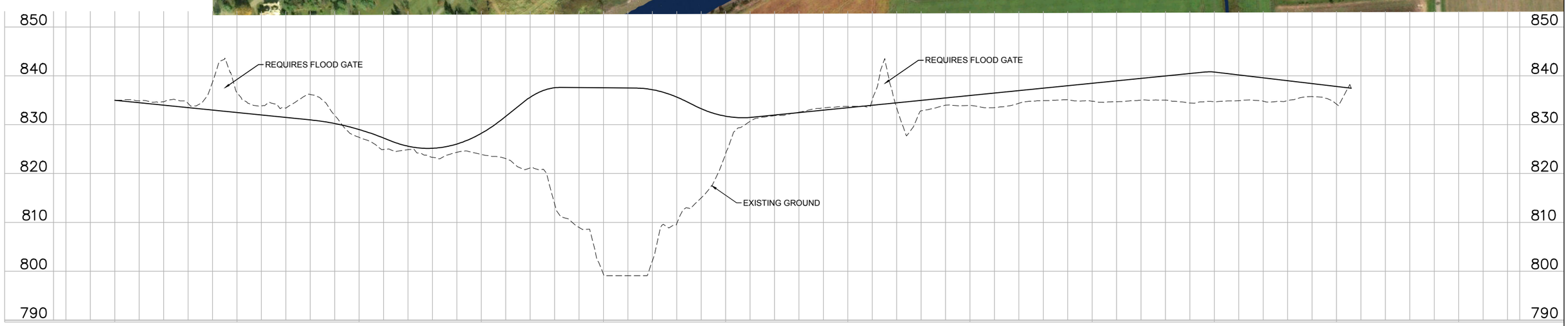
0 200 400
HORIZONTAL
SCALE IN FEET

K:\TWC_Civil\MPO\GRAND FORKS\ATAC River Crossing - Grand Forks\CAD\Plan Sheets\Exhibits\ELKS DRIVE_HIGH BRIDGE_SIMPLE.dwg October 02, 2018 - 12:43pm



QUANTITIES

ITEM		UNIT
COMMON EX.	13900	CY
COMMON FILL	22300	CY
WALK	50900	SF
BITUMINTUS	202500	SF
CURB AND GUTTER	8200	LF
BRIDGE	1000	LF



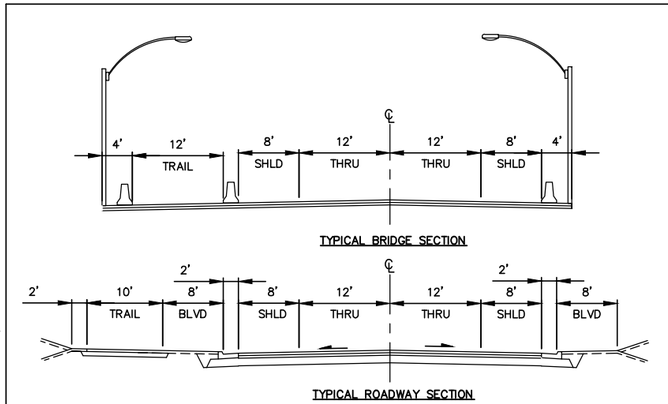
PLANNING CONCEPTS ONLY.
NOT FOR CONSTRUCTION.

GRAND FORKS
32ND AVENUE RIVER CROSSING
LOW BRIDGE WITH FLOOD GATES

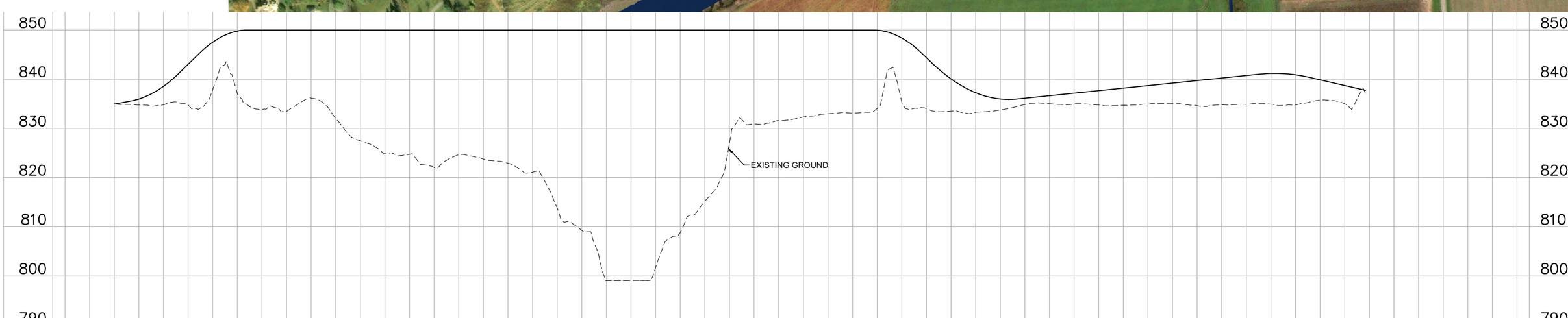
NORTH

0 200 400
HORIZONTAL
SCALE IN FEET

K:\TWC_Civil\MPO\GRAND FORKS\ATAC River Crossing - Grand Forks\CAD\Plan Sheets\Exhibits\32ND AVE_LOW BRIDGE-A_SIMPLE.dwg October 02, 2018 - 12:42pm



QUANTITIES		
ITEM		UNIT
COMMON EX.	300	CY
COMMON FILL	53700	CY
WALK	50900	SF
BITUMINTUS	203000	SF
CURB AND GUTTER	5200	LF
BRIDGE	2500	LF



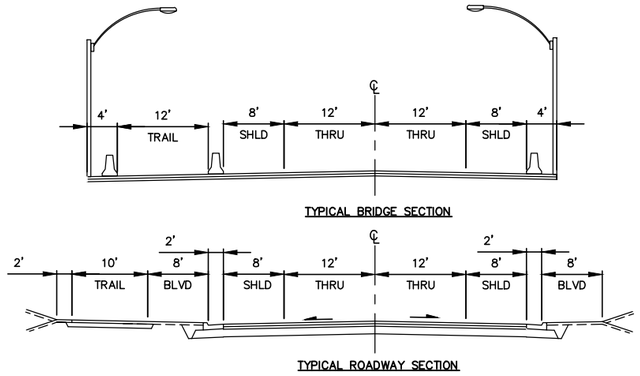
PLANNING CONCEPTS ONLY.
NOT FOR CONSTRUCTION.

GRAND FORKS
32ND AVENUE RIVER CROSSING
HIGH BRIDGE

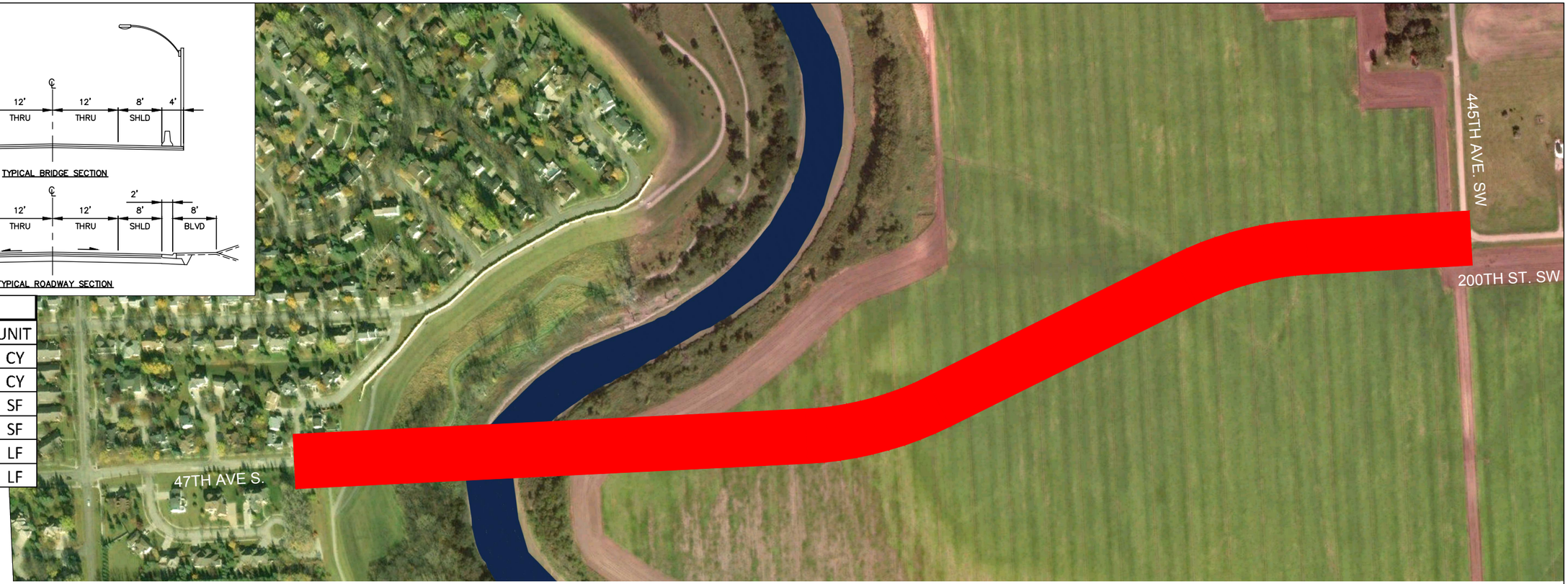
NORTH

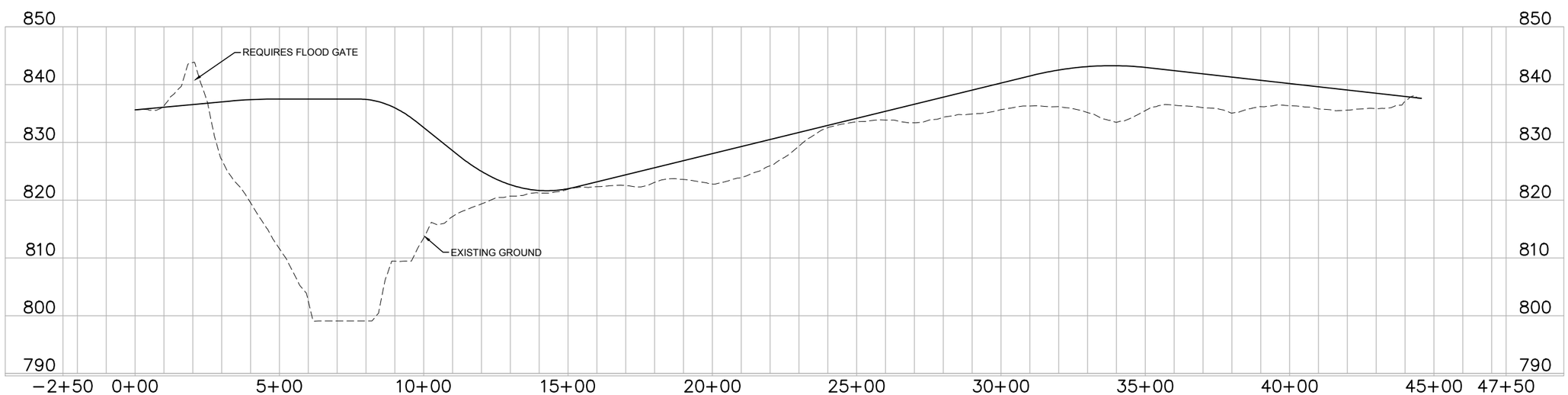
0 200 400
HORIZONTAL
SCALE IN FEET

K:\TWC_Civil\MPO\GRAND FORKS\ATAC River Crossing - Grand Forks\CAD\Plan Sheets\Exhibits\32ND AVE_HIGH BRIDGE_SIMPLE.dwg October 02, 2018 - 12:42pm



QUANTITIES		
ITEM		UNIT
COMMON EX.	2800	CY
COMMON FILL	43500	CY
WALK	44600	SF
BITUMINTUS	178300	SF
CURB AND GUTTER	7100	LF
BRIDGE	900	LF





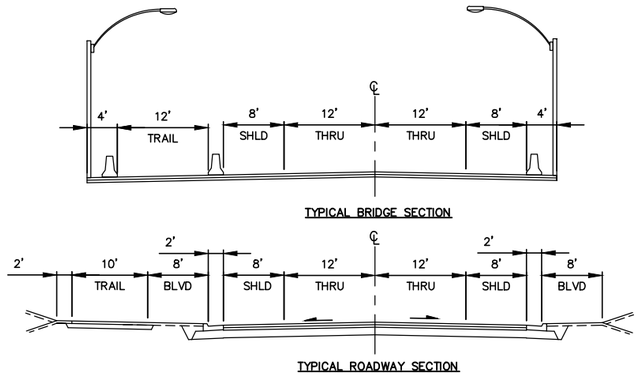
PLANNING CONCEPTS ONLY.
NOT FOR CONSTRUCTION.

GRAND FORKS
47TH AVENUE RIVER CROSSING

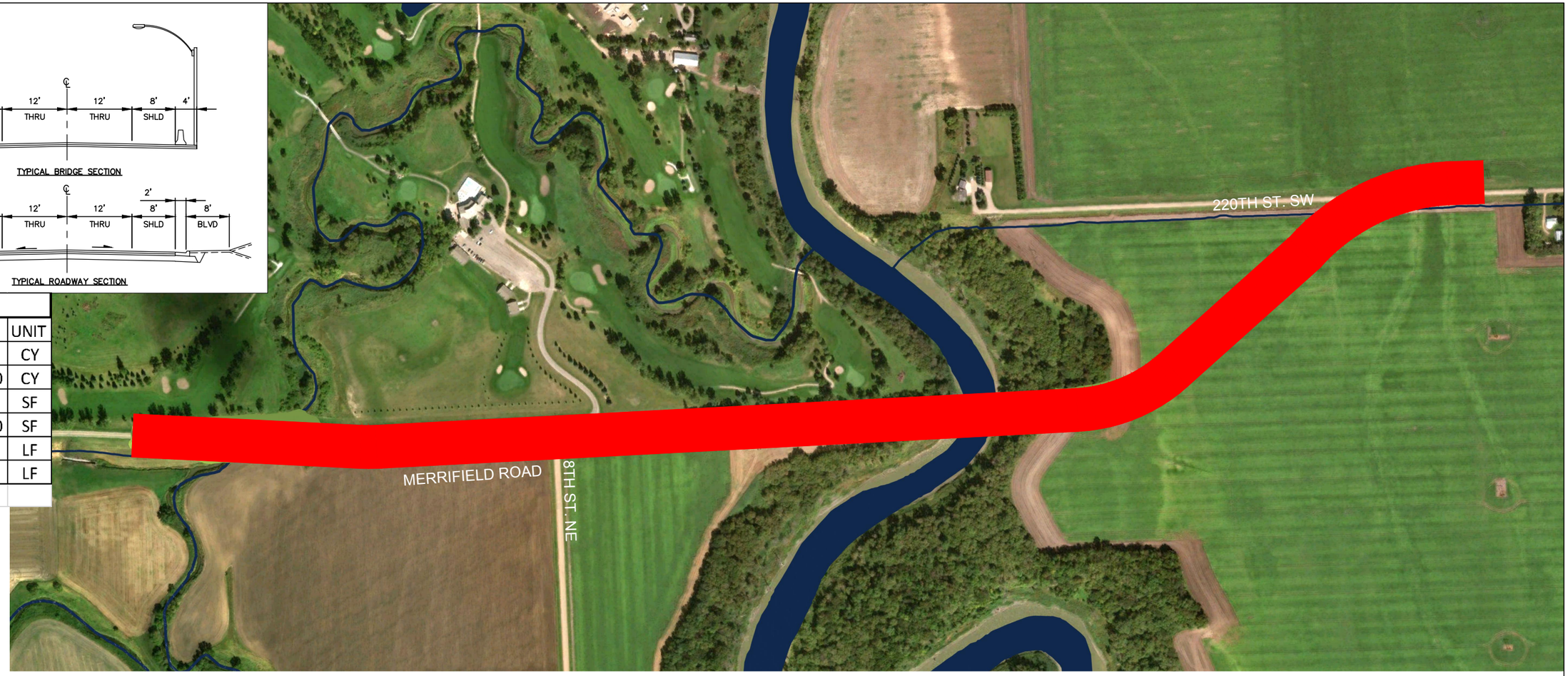
NORTH

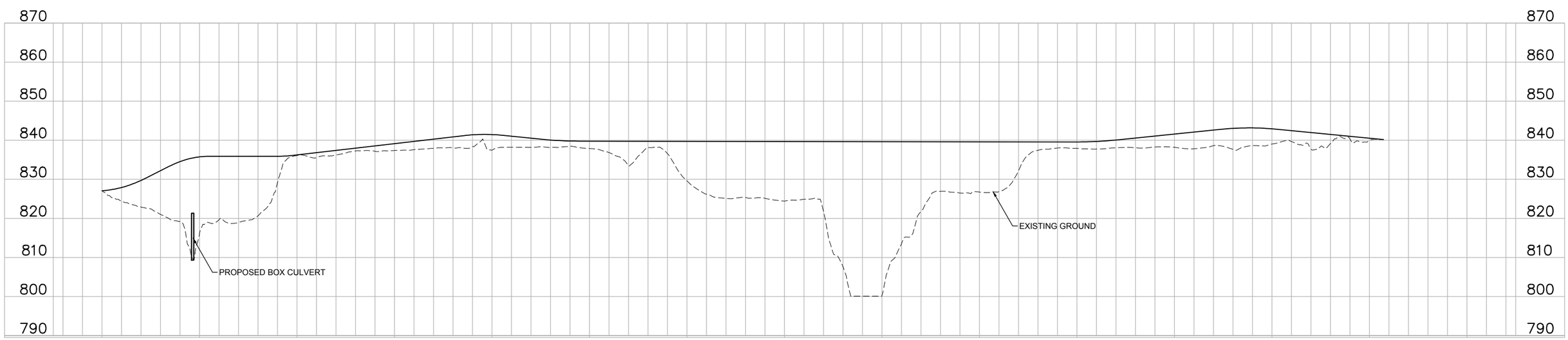
0 200 400
HORIZONTAL
SCALE IN FEET

K:\TWC_Civil\MPO\GRAND FORKS\ATAC River Crossing - Grand Forks\CAD\Plan Sheets\Exhibits\47TH AVE-SIMPLE.dwg October 02, 2018 - 12:49pm



QUANTITIES		
ITEM		UNIT
COMMON EX.	16500	CY
COMMON FILL	141800	CY
WALK	65700	SF
BITUMINTUS	262700	SF
CURB AND GUTTER	11600	LF
BRIDGE	800	LF





PLANNING CONCEPTS ONLY.
NOT FOR CONSTRUCTION.

GRAND FORKS
MERRIFIELD ROAD RIVER CROSSING

NORTH

0 250 500
HORIZONTAL
SCALE IN FEET

K:\TWC_Civil\MPO\GRAND FORKS\ATAC River Crossing - Grand Forks\CAD\Plan Sheets\Exhibits\MERRIFIELD ROAD_SIMPLE.dwg October 02, 2018 - 12:43pm